

ARCHIVES OF OTOLOGY.

A CASE OF THE SO-CALLED BEZOLD VARIETY OF MASTOIDITIS. OPENING OF MASTOID. CRANIO-OTOMY. DEATH. AUTOPSY. ABSCESSSES IN TEMPORAL LOBE AND CEREBELLUM. SINUS THROMBOSIS ON THE OTHER SIDE.

By H. KNAPP.

THE case with the above title is one of the most important and instructive that ever occurred in my aural practice. I think a detailed record of it may be as interesting to the reader as its observation has been to me. It is as follows:

Mary M., twenty-five years old, of New York City, consulted me September 25, '91, with the symptoms of an acute middle-ear catarrh on both sides.

She stated that she had had no ear disease in childhood, nor was deafness hereditary in her family. The last year she had frequently suffered from severe colds in her head which caused ear-ache on sneezing. In September, 1891, she was in Central Park, lay on the grass, felt cold (being in the sixth month of pregnancy), got a violent ear-ache, and was deaf in both ears for three days.

I found both drumheads and the walls of the inner portion of the right ear-canal, red, swollen, and coated with scales, presenting, like the drumhead, a sodden appearance. The pharynx was fairly normal.

$h = \frac{5}{4}$; $v = \frac{2}{3}$; after Politzer's inflation $v = \frac{2}{3}$, each.

I ordered her to bathe the right ear-canal with warm soap water, and syringe it with plain warm water; further to put a leech behind each ear, rest in bed the greater part of the day, and take good care of herself.

I saw her no more for four months. On Jan. 17, '92, she came again, telling me that after the consultation in September she had improved for four weeks, then the skin behind the right ear had

been swollen, red, and painful, but there had never been any discharge from the ear. The painful swelling behind the right ear had disappeared again. Dec. 23, '91, after having been out in the evening she had had earache and intense headache, loss of appetite, and dizziness in attacks lasting about five minutes. These symptoms had disappeared but the headache had remained constant. She was confined Jan. 5, '92; the delivery passed normally, but she had excruciating headache. After the confinement the headache abated for a short time, but then it returned and so did swelling behind the ear, and extended down the neck. Her physician incised it Jan. 17th, liberating a large quantity of pus. The headache was not diminished. Pus came from the wound every day, the swelling almost disappeared. During the last three weeks she had been worse again, suffering from headache, nausea, vomiting (one day), and dizziness, more in the night than during the day, depriving her of sleep.

I found the left ear normal, the inner portion of the right ear-canal still swollen and red, the upper-posterior part bulging; the drumhead red throughout. No discharge in canal. The mastoid region was red, swollen, hard, tender to the touch. The swelling was most marked behind and below the tip of the lobule. It extended $1\frac{1}{4}$ " behind and $1\frac{1}{2}$ " below the ear down the sterno-cleido-mastoid muscle. Pressure brought out thin pus through the wound. A probe could be introduced 2 cm into the opening; it passed the end of the tip of the mastoid without entering the cells, or touching rough bone. Percussion of the skull was not painful.

From the symptoms and the course of the disease I concluded that the acute aural catarrh had disappeared in the left ear, but developed in the right into the so-called Bezold variety of mastoiditis, viz., the pus had made its escape through an opening on the medial side of the tip of the mastoid into the digastric groove and the head of the sterno-cleido-mastoid muscle. Knowing from literature and personal experience that in this form of mastoiditis there is a tendency for perforation not only on the medial side of the tip, but also on the posterior wall of the ear canal, the upper wall of the tympanic attic bordering the middle cranial fossa, and the medial table of the mastoid bordering the posterior cerebral fossa, I advised an immediate operation,

which was to consist in an extensive opening of the mastoid process as a first step.

The patient consented and the operation was performed in the operating room of the N. Y. Ophthalmic and Aural Institute, Jan. 29, '92.

OPERATION. An incision, 7 cm in length, was made from the head of the sterno-cleido-mastoid muscle up, 0.5 to 1.0 cm behind the auricle. Only in the lower part the tissue was infiltrated with serum and some blood, higher up it appeared healthy. The chiselling, into healthy-looking bone, was begun at the usual place, 1 cm behind the upper wall of the auditory meatus. Pus escaped when the antrum was reached. The opening made reached from the base to the tip, 2.5 cm in length and 1 cm in breadth. It was washed out with corrosive sublimate, 1-5000, and packed with corrosive sublimate gauze.

Jan. 30th.—Swelling of head of mastoid disappeared. No discharge. Pulse 100. Temp. 100.4° F. (38° C.).

Jan. 31st. Morning: Temp. 99.2° F. No pain, no discharge. Pulse better. *Evening:* Temp. 102°, some headache. She did not complain of the ear, but had got a pleuritic effusion on the right side. The temperature varied from 99° to 101.8°. She was seen by Dr. W. H. Draper, in consultation, who examined her carefully, gave a good prognosis, advised a blister locally, digitalis and acetate of potash internally. The effusion disappeared in twelve days, and the patient was discharged from the hospital, *Feb. 13th*, fifteen days after the operation. The swelling at the head of the sterno-mastoid muscle had disappeared, the discharge from the wound at that place had ceased immediately after the operation. The wound had been syringed gently and drained by means of a perforated silver tube. $h \frac{5}{4}$; $v \frac{2}{6} +$.

For a week she felt very comfortable, then complained again of headache. No fever, no nausea.

Feb 28th.—I saw her at her house and visited her regularly every few days until her death. Her headache being intense, but no discharge from the wound, and no fever being present, I largely reopened the wound in the mastoid and inserted a silver tube, but there was no pus and the probe felt the inner plate of the bone unbroken everywhere. $h \frac{2}{4}$, $v \frac{2}{6} +$. Percussion of the skull showed no painfulness to-day, nor, I may state here, on any other day of her illness.

March 1st.—Headache less, not localized, and not limited to right hemisphere. Interior of mastoid scraped with sharp spoon, no dead bone, granulations, or pus. No discharge from ear, some wax in external auditory canal. Interior of eyes normal.

March 14th.—Had intense headache at times, then was free from it again. On the evening of the 12th she had been very gay with her sister, then suddenly she had a headache, her speech was impeded, she grew drowsy, lost her appetite, and has remained so. When I saw her she had no fever and could not be roused. In the upper part of the *left* sterno-cleido-mastoid muscle, chiefly on its medial side, there was a hard swelling, two inches in diameter. Left ear and mastoid normal. No optic neuritis. Takes no nourishment. Cavity of right mastoid kept open by silver-tube, nothing can be scraped out with sharp spoon, the inner bony wall unbroken. Right ear, mastoid, and surroundings free from irritation.

March 15th.—Speaks some. Pulse 88, temp. 100.2° . Swelling on neck, below *left* ear, less.

March 17th.—Pulse 72, temp. 98.4° ; speaks some, but does not hear. Swelling on left side of neck almost disappeared. Appetite good. Complains of headache, is more or less in a stupor, but can be roused.

March 20th.—The swelling of left side of neck disappeared. She felt better every day, had no fever, talked some, yet was drowsy; since last night more so; has a vague, staring look; does not speak. Pulse 60, temp. 99.5° . Both optic discs congested, slightly swollen, their margins somewhat covered.

The continuance of the headache, stupor, loss of appetite, vomiting, impediment of speech, the slow pulse, the temperature varying between 99° and 101° , and the beginning of optic neuritis appeared to me sure signs of a severer lesion than meningitic irritation, but I was unable to discriminate between purulent meningitis, extradural suppuration, and cerebral or cerebellar abscess. Several neurologists, who were kind enough to see the case with me, would not either venture on a special diagnosis. Considering meningitis as the least probable of the above-mentioned lesions, I advised to open the skull and search for an abscess, either on the outer side of the dura mater or in the brain. The mother and relatives did not consent.

March 29th.—The same symptoms have continued. She could be roused from her stupor, spoke coherently but laboriously, dropping letters. The swelling at inner side of head of left sterno-mastoid distinct again; hard; was thought to be a gland. Ear and mastoid healthy. Patient refuses nourishment, vomits what she tries to eat.

Up to *April 4th* there was no material change. Headache, stupor, vomiting, imperfect speech, loss of appetite, pulse varying from 60 to 70, temp. from 99° to 100° , optic neuritis marked though moderate. The treatment—cold applications to head, bromides, quinine in moderate doses, milk punch, etc., to sustain her as much as possible—had no lasting effect. The mother and relatives were tired out, and when I told them that, in my opinion, without an operation she was sure to die, with an operation probable to die, and that even under these circumstances I was still willing to operate, if they consented, they no longer refused, but asked me to do it.

The OPERATION was done in the patient's house—Drs. W. A. Holden, A. Duane, C. H. May of New York, and Dr. C. M. Ball of Keokuk, Ia., being present and assisting—April 5, 1892, under such antiseptic precautions as were possible. My plan was to open the posterior cranial fossa in order to see whether there was an extradural abscess or thrombosis of the lateral sinus; if not I intended to chisel away the posterior wall of the ear-canal and penetrate into the middle cranial fossa.

The regions behind and above the ear, having previously been shaved, were washed with soap and bichloride of mercury, $2\frac{1}{2}\text{oz}$. A large incision through the old wound and the soft parts covering the mastoid was made, the periosteum on the whole extent of the mastoid detached, and the auricle on the posterior and upper side was dissected off the bone. The whole anterior surface of the mastoid was then chiselled away, the cavity emptied, and by careful chiselling also the inner table of the mastoid was removed to the extent of 12 by 8 mm (as you see at the specimen). No pus; the dura mater and lateral sinus lay bare and appeared healthy, both to feel with the probe and to inspection as far as this was possible.

I now began to chisel forward in order to penetrate into the tympanic attic, but soon the patient grew pale and stopped breathing. She rallied on hypodermic injections of alcohol and artificial respiration, which had to be continued to the end of

the operation. By chiselling along the postero-superior wall of the auditory meatus, I could introduce a probe into a cavity which (correctly) I considered to be the attic. Not finding any pus there, I determined to penetrate into the cranial cavity by enlarging the canal, which I had chiselled into the bone, but finding on my way such hard and massive portions of bone, I desisted and changed my plan. After enlarging the opening in the integument of the mastoid by an incision curving forward and above the auricle, I easily chiselled a hole through the squamous portion of the temporal bone, 1 cm above the zygomatic process of the temporal bone, 1½ to 2 cm in diameter, directly above the external meatus. The zygomatic process could be easily felt after freeing the bone from the soft parts and even well enough before this. There was no pus. The healthy-looking, not pulsating dura mater was split, the pia and superficial layer of the brain were incised, and as both also appeared healthy I gave the operation up as hopeless.

The progress of the operation having shown that there was neither meningitis, nor an extradural suppuration, nothing but an abscess in the brain substance seemed to be left, but in the exceedingly feeble and critical condition of the patient, I shrank from thrusting a knife or a syringe-trocar into the temporal lobe in search for an abscess which might have been in some other part of the brain as well as there.

I carefully washed and syringed the wound out with $\frac{1}{5000}$ bichloride solution, packed it with sublimate gauze, and applied an antiseptic dressing. The artificial respiration was continued $\frac{1}{4}$ h. longer, and when we left it off we had the pleasure to find that the pulse became stronger, the color of the face less pale, though the breathing was superficial. The pleasure did not last long; in $\frac{3}{4}$ h., before I had left the house, the patient died.

The AUTOPSY was made twenty hours after death, Drs. Holden, Bailey, and Ball assisting. The skull was opened in the ordinary way. Nothing essentially morbid was found on the convexity of the brain. On the tentorium cerebelli there was some puriform liquid. After removal of the brain, the *right lateral sinus* was found filled with dark, clotted blood, in its portion opposite the operation-wound

in the mastoid and its vicinity. Farther backward toward the torcular Herophili, however, the contents of the lateral sinus became puriform. At the torcular all the confluent sinuses were filled with creamy pus; the longitudinal sinus in particular and the *left* lateral sinus were tightly filled, and evacuated large quantities of pus on being cut. The suppuration continued into the *left* internal jugular vein and when we pressed on the swelling under the upper part of the left sterno-mastoid muscle the pus welled out through the foramen lacerum into the posterior cranial fossa.

On examining the *meninges* of the brain the dura showed no abnormality anywhere, but the pia over the right temporo-sphenoidal lobe and the right cerebellar hemisphere was somewhat milky here and there, and on picking up and tearing some of its small veins they were found to be filled with pus.

Underneath this infiltrated pia there was a thin layer of healthy *brain* substance, but on making successive cross-sections through the brain, *two abscesses* were opened, both containing thin, white, somewhat greenish pus. The one was in the right temporal lobe, the other in the right cerebellar hemisphere, directly opposite the operating defects in the cranial bones. The abscesses were each about the size of a walnut, their walls soft and ragged, not hardened like the so-called pyogenic membrane. The other parts of the brain showed nothing noteworthy; in particular I may mention that the ventricles contained no more than the ordinary amount of transparent liquid. The pieces of brain containing the abscesses and the right temporal bone were removed, taken to the laboratory of the N. Y. Ophthalmic and Aural Institute, where I examined them at once. Of both abscesses I made dry-cover specimens and cultivations in gelatine and agar, of which hereafter.

The *temporal bone* was freed from its soft parts and the walls of the mastoid process carefully investigated. The defect made by the operation went through the transverse sulcus, just in the right place for opening the lateral sinus, if thrombo-phlebitis had been found.

On the *medial wall of the tip of the process* there was a

small but distinct perforation of the bone, leading into the digastric groove (I have passed a silk thread through it in the specimen), verifying the diagnosis of the Bezold variety of mastoiditis.

By the second operation a free communication had been made between the mastoid cavity and the tympanic attic, chiefly by enlarging the antrum, but a portion of solid bone between the antrum and the auditory canal, the inner end of the postero-superior wall of the bony meatus, had been left.

The whole tympanic cavity, but especially the attic, was densely *packed with granulating tissue*, so that after the removal of the drum membrane the ossicles had to be searched for in the exuberant mucous membrane. They were found in their proper place and healthy. There was no caries in any part of the walls of the tympanum.

The *microscopic specimens* made from the cerebellar abscess showed no micro-organisms, and all the cultivations taken from it were sterile. The specimens from the abscess in the temporal lobe showed a multitude of cocci, and in some places many small bacilli. Of the cultivations two, by their form and liquefaction of the gelatine, appeared to be *staphylococcus albus* and *aureus* (one turned yellow), and the microscope verified the appearance ; in one tube, however, there was a mixture of staphylococcus with a short, very distinct *bacillus*, whose breadth was about one third and whose length about double the diameter of a coccus.

RECAPITULATION.

If we recapitulate the history of the foregoing case, we find a young woman of a good constitution suffering, during the course of a year, from repeated attacks of acute naso-pharyngeal catarrh extending into both ears. The left ear recovered. The fourth and later attacks showed implication of the right mastoid with marked meningitic irritation. She was pregnant and during the last months the attacks were more severe. The upper part of the sternocleido-mastoid muscle became red, swollen, and painful ; ten days after her confinement her physician made a deep inci-

sion into the swollen head of the muscle, liberating a good deal of pus. The relief being only temporary, I opened the mastoid from its base to the tip, found pus in the upper part, and kept the wound open by a perforated silver tube. The patient felt relief, but soon had a pleuritic exudation as an intercurrent disease, which disappeared in less than two weeks. Discharged from the hospital as cured, she felt well for two weeks, then symptoms of cerebral irritation returned and with varying intensity lasted until her death, three months later. These symptoms were: persistent headache, nausea, occasional vomiting, dizziness, stupor, impediment of speech, loss of appetite, constipation. The pulse at first varied between 70 and 88, later sank to 60 per minute; the temperature varied between 98.4° and 100° never rapidly changing. There were no convulsions, deliria, chills, or abnormality of sensation. The ear never gave her any more trouble, and there never was any discharge from the ear-canal, though the drumhead and adjacent portion of the ear-canal were red and bulging. Two months before death a sudden swelling was noticed below the head of the other (the left) sterno-mastoid muscle. It varied in size, but never disappeared entirely. The left ear remained healthy. The eyes examined with the ophthalmoscope were found healthy until the last months when the development of optic neuritis could be distinctly watched. The extension of suppurative ear disease to the brain being diagnosticated, craniotomy was advised, but not consented to until a day before her death.

The operation was made at the patient's house. The opening in the mastoid was enlarged, and extended into the cranial cavity, by an opening 3 cm by 2 cm. Dura mater and lateral sinus found healthy. Then the wound was extended into the tympanic attic, by enlarging the mastoid antrum and removing part of the posterior wall of the ear canal with the chisel. No pus being found in the tympanic cavity and the bone being thick and hard, the middle cranial fossa was opened by chiselling a hole, 2 cm in diameter, through the squamous portion of the temporal bone beginning 1 cm above the ear-canal. No extradural sup-

puration being found, the dura mater and the superficial layer of the brain were incised, but found healthy. In the course of the operation the patient became pale and breathless. She was sustained by hypodermic injections of alcohol and by artificial respiration, the latter being kept up until the end of the operation. On account of her feeble condition I desisted from making exploratory incisions or punctures into the brain substance, considering the case then as absolutely hopeless. After the operation, even after the discontinuance of the artificial respiration, she rallied, for three-quarters of an hour, but then suddenly collapsed and died.

The *autopsy* showed (1) a perforation in the medial bony surface of the tip of the mastoid process, verifying the diagnosis of Bezold's variety of mastoiditis; (2) upper part of the tympanic cavity densely filled with granulation tissue, but free from pus; (3) the right lateral sinus (that of the diseased ear) healthy, but filled with dark clotted blood; (4) the dura healthy throughout; (5) the pia of the right temporal lobe and the right cerebellar hemisphere milky, its small veins filled with pus; (6) the sinuses in the median line, those adjacent to the median line on the right side, and all the sinuses on the left side, furthermore the left internal jugular vein as far as the swelling noticed underneath the upper portion of the left sterno-mastoid muscle, filled with pus (purulent thrombo-phlebitis); (7) in the right temporal lobe an abscess the size of a walnut, and in the right cerebellar hemisphere another of the same size; (8) the remainder of the brain, especially the ventricles, normal; (9) microscopic specimens and cultivations from the cranial abscesses showed small bacilli, but prevalently *staphylococcus aureus*.

REMARKS.

This case is an example of an acute aural catarrh leading to death through extension into the mastoid and the cranial cavity. There never was otorrhœa, yet there was suppuration in the mastoid. No signs of otitis externa having been noticed, the pyogenic germs must have travelled from the naso-pharynx (she suffered from acute attacks of coryza)

through the E. tubes into the middle ear, and through the antrum into the mastoid process, here developing that slow form of mastoiditis which Bezold has so masterly described. This form is distinguished by a tendency to seek an outlet for its inflammatory products, along the inner table of the bone at different places, viz. (a) perforating it on the medial side of the tip and extending down the neck alongside the sterno-cleido-mastoid muscle; (b) perforating the posterior wall of the ear-canal and discharging its products through a fistula in the canal or through the tympanum; (c) perforating the cranial cavity, producing extradural suppuration, or cerebral and cerebellar abscesses. I have seen examples of each variety of this form of mastoiditis to which of late so much attention has been paid.

In our case the *course of the disease* was as follows.

Attacks of coryza for several months. In September after an exposure by lying on the grass and being chilled, a violent attack of otitis media catarrhalis in both ears, which improved but was not perfectly cured. Four weeks later the first symptoms of mastoiditis. Improvement again; then in two months, after an evening of gayety, the first cerebral symptoms with swelling of the mastoid extending downward. Evacuation of pus below ear brings relief for two weeks. Large opening of mastoid affords relief for four weeks, in spite of an intercurrent pleuritic effusion. Then the cranial symptoms are marked with short remissions. They are not so clear as to admit of a special diagnosis defining the nature and location of the morbid process. Death from cerebral abscess and thrombo-phlebitis.

The operation of craniotomy was done in the right way, and I would, if a case occurred, do it in the same manner again, only sooner. The uncertainty of a special diagnosis, not the surgical procedure, is the great difficulty in these cases, a fact upon which also v. Bergmann dwells in his classical monograph on the surgical treatment of brain disease (1889). Symptoms of meningitic irritation are marked in a great number of acute and subacute ear diseases, which recover by care without surgical interference. I am afraid there is at the present day too great a tendency to opening

mastoids and skulls. Precision in the determination of the indications when or when not to operate can only be obtained by a critical comparison of many fatal cases, especially when post-mortem examinations have been made. As exploratory operations, so as gynecologists now practise laparotomy, both mastotomy and craniotomy are, in my opinion, not yet harmless enough to be justifiable in many cases.

Our case was remarkable by the absence of the objective symptoms upon which commonly so much stress is laid.

1. There evidently was *suppuration in the mastoid* long before external swelling indicated it.

2. The *absence of otorrhœa* through the whole course is also remarkable and exceptional.

3. There was *sinus thrombosis* of great extent, without the common symptoms of rapid rise and fall of temperature. I measured the temperature whenever I called and the sister of the patient did it in my absence twice daily. It never rose above 101° . The sudden swelling at the left side of the neck, the side of the healthy ear, took me by surprise. It was peculiar in its shape, hard and round, about two centimetres below the tip of the mastoid, with a sharp inferior limit. Ordinarily the thrombosed jugular can be felt as a hard and painful cord along the side of the sterno-mastoid muscle. Each of the neurologists who examined the case with me thought that thrombo-phlebitis as well as meningitis could be excluded.

4. The *sinus thrombosis was most marked on the side of the healthy ear*. I can explain this only by the supposition that the formation of abscesses in the brain and cerebellum preceded the thrombo-phlebitis, and that the clotting of the right lateral sinus interrupted the circulation on the side of the diseased ear. The purulent contents of the small veins in the pia over the abscesses were emptied into the torcular and conveyed by the left lateral sinus into the left internal jugular. The abrupt swelling in the latter can be explained by plugging of the lower part of the vein with clotted blood before liquefaction of the thrombus had taken place, in the same way as the pus had been prevented from passing into the right internal jugular by the blood clots in the lateral

sinus found by the autopsy. The case shows how occult the objective symptoms and how unexpected the location of cerebral thrombo-phlebitis may be.

5. The cerebral abscesses showed, aside from the insignificant fever, only one objective symptom during the last month, that was the *double optic neuritis*. Choked disc, as far as experience has shown, is an inconstant and apparently late symptom of otitic brain disease. It does not always indicate a fatal termination of the case and disappears when the patient recovers, even in cases of pyæmia. There was no localized pain, either on percussion or spontaneously, to indicate an abscess in the case under observation.

I will conclude this paper with some remarks on the **significance of the subjective cerebral symptoms in middle-ear inflammation.**

1. *Transient headache, nausea, vomiting, and dizziness* in acute cases indicate meningitic irritation. These cases almost all recover with or without mastotomy, only a few exceptional cases of fatal termination being on record.

2. *Persistent headache, nausea, vomiting, and dizziness*, especially when the discharge from the ear diminishes, signify transition of meningitic irritation into real meningitis, and demand surgical interference:—paracentesis of the drum inembrane, especially the membrana flaccida when bulging, or opening of the mastoid after Schwartz or Küster.

3. The *above symptoms*, with *delirium, stupor, impediment of speech, chills, spasms, drowsiness and coma*, signify fully developed intracranial suppuration. In the majority of such cases it may be difficult or impossible to discriminate between thrombo-phlebitis, extradural and cerebral or cerebellar abscess. The special diagnosis and localization, when strengthened by valuable objective symptoms, such as painful swelling and hardness of the internal jugular vein, (sinus thrombosis), localized pain spontaneous or on percussion of the skull (abscess), a fistula in the cranial bones (extradural suppuration), may justify, even demand, surgical interference, namely, opening the posterior cranial fossa to ligate and cleanse the lateral sinus, or opening the posterior or

middle fossa to liberate the extradural accumulation of pus, or opening the middle or posterior fossa to evacuate an encephalic abscess. Of all these varieties a certain, though small, number of cases¹ is known in which the diagnosis was correctly made and the operation successfully performed.

¹ Seventeen cases. See the bibliography in the paper by Truckenbrod in the preceding number of these ARCHIVES, p. 180.

TWO UNUSUAL CASES OF INTRACRANIAL INFLAMMATION FOLLOWING PURULENT OTITIS MEDIA WITH MASTOIDITIS.

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IN the following brief report of two cases which have come under my own observation, I desire to call the attention, not only of otologists, but also of the general practitioners, to a danger which attends suppurative inflammation of the middle ear with involvement of the mastoid, and which, though not unknown, is of such unfrequent occurrence as to be frequently forgotten.

The danger to which I refer is the involvement of the intracranial structures in an inflammatory process, from the extension of the inflammation from the external surface of the temporal bone. As is well known to every surgeon, when grave intracranial complications arise during an inflammation of the middle ear or the surrounding bony parts, the inflammation usually gains access to the cranial cavity, either through the roof of the tympanum, by rupture or by metastasis; or the lateral sinus is infected in either of the above ways by the suppurative process in the mastoid; or the channel of invasion is the internal auditory meatus, along the sheath of the auditory nerve to the meninges.

Sometimes, but with the greatest rarity, the infection takes place in the following manner. The pus formed in the middle ear or mastoid appears beneath the periosteum, giving rise to the ordinary post-auricular abscess, so familiar to every one who has seen even a few neglected cases of purulent otitis media. With the appearance of the pus

beneath the periosteum, the symptoms are apt to abate somewhat, since the tension is relieved, hence such an abscess may be neglected for a considerable period of time. During the interval, however, the purulent material burrows, dissecting up the periosteum from the bone over a large area, and thus depriving it of its nutrition to a great degree. There is practically no limit to the extent to which the bone may be thus denuded. The next step is a necrosis of this bone over a small area, and as the small sequestrum breaks down, pus is absorbed by the internal periosteum or dura, and a meningitis set up. It is not necessary even for necrosis to take place, in order to set up an inflammation of the dura. Numerous venous channels exist between the external and the internal periosteum of the cranial bones, and these, passing through the parietes of the skull, can easily carry the infection to the interior.

In young children, before the ossification of the petrosquamous suture, or rather its continuation, the suture between the mastoid and squamous portion of the temporal bone, infection is especially liable to take place, for the reason that, in many instances, this suture encloses a fold of dura mater and this increases the chances of infection, in case the external surface of the mastoid and the neighboring parts are constantly bathed in pus. It thus happens that all danger has not passed when we incise a post-auricular abscess, and evacuate the pus; it is only by a most careful exploration of the denuded bone that we can say with any degree of certainty what the termination will be. A small necrotic area may be present, through which communication with the intracranial structures may already exist, and the infectious process may have already passed beyond the limits of simple operative procedure before the abscess has been incised. Two cases which I have seen during the past two and one half years will show that this danger is not an imaginary one.

CASE I was that of a child of about ten months, who, when first seen, was suffering from a purulent otitis media of about nine months' duration. Behind the auricle was a diffuse fluctuating mass, extending fully one inch behind the posterior attachment

of the auricle, and superiorly about the same distance above the auricular attachment in this direction. The mother stated that this tumor had been present for about three weeks. The discharge from the external meatus at this time was profuse. At no time, according to the mother's statement, had the child appeared to suffer much pain. The fluctuating swelling behind the ear was opened by a free incision, and a large quantity of pus evacuated. The underlying bone was found rough and denuded in every direction, and thus the canal superiorly and posteriorly was dissected completely away from the underlying bony structures. As the operation was performed without anæsthesia, no prolonged attempt was made to find a sinus entering the structure of the mastoid, the wound was packed with iodoform gauze, and a compress and bandage applied.

The wound was dressed daily by the nurse, the child being brought to the hospital each morning for this purpose, while the mother was directed to cleanse the ear frequently during the day by means of the syringe.

Upon examining the wound a few days after the operation, a sinus was found, which admitted the probe into the mastoid, and fluids injected into this opening easily returned through the meatus ; the secretion soon diminished in amount, and the child seemed to be doing very well.

In the course of a few weeks, the external wound had nearly closed, and the discharge from the ear was also growing much less in quantity ; fluids injected into the sinus leading to the opening into the mastoid still returned through the meatus, showing that the drainage was efficient. The margins of the external opening, however, presented the exuberant granulations so characteristic of dead bone, and a probe introduced showed that the denuded area which existed when the abscess was first opened, had not decreased in size. As the child was doing well, however, no change was made in the treatment, and the orifice of the sinus over the mastoid at last contracted, until it would just admit the point of the syringe ; the discharge from the sinus was so slight that frequently a crust would form over it under the dressing, it being necessary to separate it each time the wound was dressed, which was now every second or third day, this procedure having been entrusted to the mother, on account of the difficulty of bringing the child to the hospital during the winter months.

No further improvement taking place, I proposed to the mother the advisability of reopening the wound under anaesthesia, and removing the carious bone with the curette ; this she finally acceded to, and nearly a week later chloroform was administered and an incision made over the affected region, following the course of the old incision and extending upward, and somewhat backward, about two thirds of an inch above the superior margin of the bony canal. On separating the edges of this incision, and exploring the deeper parts with the probe, this instrument was found to enter an opening at the upper part of the incision, and to pass without encountering the least resistance, for a distance of two and one half inches directly inward ; the hemorrhage from the wound was very free, the blood being decidedly venous in character. Recognizing at once that the wound opened into the cranial cavity at the line of the squamo-mastoid suture, and further, as the meninges had not been encountered, that infection and subsequent meningeal disintegration had taken place at this point, the wound was packed and the child permitted to come out from under the influence of the anaesthetic. The serious nature of the discovery was imparted to the parents, and close questioning elicited the fact that a few days previously, and during the interval in which I had not seen the child, the tumefaction behind and above the ear had re-appeared, and that the child had been drowsy, or, when awake, irritable. On the day preceding the operation, the mother had removed the dressing, and the crust covering the sinus, and immediately a large amount of pus was discharged, and the child appeared relieved and hence did not attract my special attention immediately before the operation.

On the following morning, the wound was dressed, and the child appeared natural, but the next day marked cerebral symptoms, indicative of meningeal inflammation, appeared, and the case terminated fatally at the end of a few days. No autopsy was permitted.

In this case there seems to be no doubt that although the mastoid cortex had been perforated, and satisfactory communication with the middle ear established, yet during the time the post-auricular abscess remained unopened, the periosteum had been stripped from the bone over a large area, which subsequently failed to regenerate ; in this way

perforation at the sutural line took place, and as the external opening over the mastoid gradually closed, infection occurred through the sutural perforation from the purulent material within the abscess cavity, leading to meningeal inflammation and disintegration at this point.

The history carries with it the suggestion that, in young children especially, a thorough examination of the entire denuded area should be made upon opening any abscess connected with the mastoid, and the sutural lines examined in case the bone is denuded in these situations, and also that although an inflammation within the mastoid may have terminated in spontaneous perforation of the cortex, the pus in this location is still a potent factor for evil.

Schwarze¹ cites a case of abscess of the temporal lobe in a child, the result of a suppurative process in the middle ear, the infection having taken place through the petro-squamous suture; such cases are not as rare as those in which the infection takes place, as in my case, through the continuation of the suture which marks the junction of the squamous and mastoid portions of the temporal bone.

It would seem that, while the sutural junctions in young children might be somewhat easy points of invasion for purulent material, the compact mass of the adult temporal bone would naturally furnish a barrier to such an inroad. This we find is not the case, as the following history will show:

CASE 2.—J. C., æt. forty, was admitted to the hospital with a history of a purulent discharge from the right ear of four weeks' duration. The pain had been severe until the discharge appeared, after which time it had caused him very little trouble. Patient had been treated for syphilis, and there was evidence of a former iritis in the left eye. Examination revealed a great amount of swelling and œdema of the tissues above and behind the right auricle; the œdema extended forward, involving the right eyelid, almost closing the eye. The external auditory canal was greatly swollen, especially along the postero-superior aspect and in its deeper parts. The membrana tympani exhibited a perforation of small size in the postero-superior quadrant, through which pus could be seen to exude slowly.

¹ *Archiv für Ohrenheilk.*, vol. xxxii., p. 295.

Pressure over the œdematosus region above and behind the auricle, elicited a moderate amount of tenderness ; the patient also complained of a dull pain over the entire right side of the head.

OPERATION : After a thorough cleansing of the parts, an incision was made from the tip of the mastoid to a point three fourths of an inch above the level of the superior wall of the canal, close to the attachment of the auricle. The tissues were greatly thickened and the bone was found denuded throughout the entire extent of the incision, and over a considerable area beyond the limits of the incision, in all directions. The chisel was applied and an attempt was made to open the antrum. The entire mastoid was found to be sclerotic, and after chiselling over a broad area for a considerable depth, the posterior wall of the canal was broken down and communication with the middle ear established in this way. The wound was dressed in the usual manner and the patient returned to the ward.

The history of the case was uneventful for eight days, except for the persistence of the œdema of the right eyelids, as well as of a certain amount of thickening and infiltration in front of the tragus. On the eighth day the patient complained of headache, and the temperature, previously normal, rose to 100.5° in the evening ; the appearance of the wound was unchanged, and the following morning the temperature was normal and the unpleasant symptoms had disappeared. The night, however, was an uncomfortable one, the patient complaining of intense headache upon the right side. This persisted throughout the following day, and was not attended with any rise of temperature ; the mental condition was perhaps a little dull, but at the time I attributed this more to the general temperament of the patient than to any other cause. Upon visiting him in the afternoon, an inspection of the wound revealed an increase in tension of the parts lying in front of the tragus, together with a more marked œdema in the right anterior temporal region. Believing that there was deep-seated suppuration beneath these swollen tissues, I anæsthetized the patient and prolonged the former incision forward and downward, liberating about two drachms of pus from beneath the periosteum. The bone over the area was very rough, and so much degenerated that in tilting the flap downward it easily crumbled under the elevator. The removal of these fragments revealed the meninges bulging into the wound. The dura was deeply congested and granular ; pulsation could be felt. Exploratory puncture with a hypodermic needle yielded only a bloody fluid.

After removing all softened bone, thus enlarging the opening considerably, the wound was packed and the patient returned to bed.

On the following day, there was considerable headache and the condition of hebitude was well marked. The wound was dressed, and was found to be doing well; the intradural pressure appeared less marked than at the time of the operation. During the night there was mild delirium; in the morning the patient at first seemed a little brighter than upon the preceding day, but he soon passed into a condition of stupor, from which he could only be aroused with difficulty; in the afternoon the breathing became stertorous, and assumed the Cheyne-Stokes type, and a well marked paresis of the right upper and lower extremities was developed. Dr. Abbe kindly saw the case with me, and concurred in the opinion as to the advisability of exploring the cranial cavity. The patient was anæsthetized and, assisted by Drs. Abbe and Bacon, and by Drs. Esson and Ard of the house staff, I enlarged the opening into the cranial cavity in all directions by means of the rongeur. A dural flap was then raised, and an aspirating needle was passed into the cerebral substance in several directions, without revealing any collection of fluid. A director was passed beneath the meninges, inward along the petrous portion of the temporal bone, and forward toward the frontal region, without evacuating any fluid. The lateral sinus was exposed and found to be healthy. No further exploration appearing advisable, the dural incision was closed with catgut sutures, the external wound dressed with iodoform and bichloride gauze, and the patient returned to bed. The coma remained unchanged after the operation, and death ensued eighteen hours later. The temperature, except for the rise already noted, had been normal throughout.

The POST-MORTEM EXAMINATION by Dr. Weeks revealed a hemorrhagic pachymeningitis extending over the entire right side, but most marked over the frontal and temporo-sphenoidal regions. The effusion had in a marked degree flattened the convolutions, especially in the frontal region. In addition to the hemorrhagic lesion, a small amount of purulent exudation was found upon the internal surface of the dura, possibly due to the breaking down of the fibrin of the clot. The brain itself was normal. The roof of the tympanum exhibited nothing abnormal, and the meninges in this region were healthy.

In this case then, the pus resulting from the inflammatory process in the middle ear, not being able to find an exit through the mastoid cells, owing to the osteo-sclerosis which existed in this region, dissected up the periosteum of the external auditory meatus, and entering the temporal fossa burrowed beneath the periosteum, denuding the squamous and mastoid portions of the temporal bone over a large area, causing a circumscribed necrosis of the squamous portion of the temporal bone. At this point an inflammation of the dura was set up, and this inflammation, instead of following the ordinary course of an infective pachymeningitis, took on the hemorrhagic form of inflammation, characterized, as we know, by the formation of a large number of thin-walled blood-vessels, the subsequent rupture of a number of these vessels giving rise to the submeningeal effusion, which terminated the life of the patient. Had the subdural effusion been evacuated by the surgical procedures instituted, the life of the patient might have been prolonged, although from the nature of the affection the ultimate result must almost necessarily have been fatal.

These two cases furnish us with sufficient evidence that a subperiosteal abscess of the mastoid region may in itself constitute a somewhat grave condition, and that even when a free channel is established from the middle ear to the outer surface of the mastoid, the danger of purulent infection of the cranial contents has not passed. I am aware that this mode of infection is not a discovery. Attention was first called to it by Andeer,¹ who reported a case of meningitis following a caries of the external surface of the temporal bone, consecutive to a subperiosteal mastoid abscess in a child of one and a half years. The child had suffered from a purulent otitis media previously. Somewhat similar cases have been reported by Pomeroy,² and Reinhard and Ludewig,³ as occurring in children, while Moore⁴ observed an

¹ *Arch. für Ohrenheilk.*, 1874, vol. ix., p. 139.

² Internat. Otolog. Congress, 1876, *Arch. für Ohrenheilk.*, vol. xii., p. 313.

³ *Arch. für Ohrenheilk.*, vol. xxvii., p. 218.

⁴ ARCH. OF OTOLGY, vol. xi., p. 25; translation in *Zeitsch. für Ohrenheilk.*, vol. xi., p. 254.

instance occurring in a male of fifty years. Andeer in his paper calls special attention to the infection of the cranial contents from a subperiosteal abscess, a point which is not especially emphasized by the other writers. In none of the cases reported, however, has the metastatic meningeal inflammation been of the hemorrhagic type, and I am of the opinion that this is an exceedingly rare occurrence.

In closing, I desire to thank Dr. Ard of the house staff of the New York Eye and Ear Infirmary for the careful notes of Case 2 which he has so kindly furnished.

A CASE OF DESTRUCTION AND PARTIAL OSSIFICATION OF BOTH LABYRINTHS, PROBABLY IN CONSEQUENCE OF MENINGITIS.

By PROF. H. STEINBRÜGGE, GIESSEN.

Translated by Dr. WARD A. HOLDEN, New York.

(*With Figs. 1 and 2, Plate III.*)

On the 23d of May, 1889, a ten-year-old boy, F. E., was brought to the Giessen clinic in a comatose condition, and died the following day. Examination of the almost unconscious patient showed widely dilated pupils, increased cutaneous reflexes, general pallor of the skin, with no appreciable changes in the thoracic or abdominal organs. Now and then there were deep inspirations or loud groans. The temperature was 37.2° . The persons accompanying the patient gave a meagre history, which was completed by later inquiries.

The autopsy showed hydrocephalus internus of high degree, no macroscopic changes in the meninges or brain substance; bronchitis, calcification of the bronchial glands, slight swelling of the mesenteric glands, hypertrophy of both tonsils. As was learned later, the boy had been seized, fourteen weeks before his death, with an attack of headache, vomiting, and convulsions, and had been unconscious for several hours. He had a high fever, his neck was stiff, and his head bent backward. Three days later it was noticed that he did not hear. The patient did not recover from his illness, although at times he was able to leave his bed. The fever and the headache continued to recur.

The macroscopic examination of the ears showed the following: The right membrana tympani has a fairly large round perforation in its anterior half; the mucous membrane

of the tympanic cavity appears thick and grayish-white. The mastoid process is sclerosed and contains few air cells.

The mucous membrane of the left membrana tympani is thickened and discolored; there is a small cicatrix in the anterior superior quadrant. The mucous membrane covering the long process of the incus is adherent to the posterior wall of the tympanic cavity. The mucous membrane of the wall of the labyrinth and of the mastoid antrum is thickened and its vessels injected; there is some mucous exudation at the bottom of the tympanic cavity. Air cells are more numerous in the mastoid process than on the right side.

The microscopic examination of the labyrinth revealed the well-known consequences of intense inflammation, in the destruction of the normal soft parts, the new-formation of very vascular connective tissue, and partial ossification of the latter. In the left cochlea the lower turn was more plugged with connective tissue and new-formed bone than the upper turns, corresponding in this regard to former observations. Only the crista spiralis and the ligamentum spirale, the latter partly ossified, could be recognized in their outlines. The new-formation of connective tissue extended into the aqueductus cochleæ. Many vessels were seen in the tissue that filled the lower turn; and there were a number of extravasations of blood due to rupture of their walls. In some of the preparations, the components of the upper turns of the ductus cochlearis were destroyed except for a small group of cells, and in the middle turn there were only a few cells in the location of Corti's organ. The ligamentum spirale was partly separated from the scalæ, and isolated tracts of connective tissue passed through the upper scala; Reissner's and Corti's membranes were wanting here. The membrane of the fenestra rotunda was thickened on both sides by new connective tissue. The mucous membrane of the promontory was moderately swollen, and infiltrated with cells.

The nerve fibres of the acoustic in the internal auditory canal were preserved here and there, but for the most

part degenerated and replaced by connective tissue, which did not stain with chromic acid like medullary substance. In this case also the fibres of the facial nerve had withstood the effects of the inflammatory changes.

At the entrance of the central canal of the modiolus the acoustic nerve fibres were almost entirely destroyed. The ganglion cells of Rosenthal's canal appeared shrunken; beyond this no nerve fibres passed into the *laminæ spirales*.

The vestibule, the ampullæ, and the semicircular canals were filled partly with connective tissue, partly with bony substance; there being scarcely a trace of the normal structures. The ossification was farthest advanced in the semicircular canals, which were so filled with the bony mass that they could with difficulty be recognized (Fig. 1).

The quantity of blood-vessels within the new-formation is remarkable, as in number and size they far surpass those of the surrounding bone. Sections of the twigs of the vestibular nerve show preservation of a portion of the fibres, but their number is small.

The right labyrinth showed in general the same changes as the left, but the upper turns of the cochlea contained more connective tissue than the left. In the right inner semicircular canal small splinters of bone were seen within the thickened dural sheath, not adherent to the bone and corresponding in size to cavities in the bony wall, apparently the result of severe inflammation in the region of the periosteal covering, with disseminated necrosis of the tissues.

The consecutive ossification of the periosteum detached from the wall of a semicircular canal as shown in Fig. 2, is also remarkable. The detachment took place no doubt at the beginning of the inflammatory process, and remained limited to a portion of the periphery of the bony canal. The membranous semicircular canal is destroyed, and the greater portion of the bony canal is filled with connective tissue and thin-walled vessels, which latter show groups of blood corpuscles outside their walls. The ossification began here apparently in the adherent periosteum, and some little distance into the detached folded layer of periosteum (Fig. 2, *a*).

Besides this there was a detachment of the base of the stapes in consequence of the purulent destruction of the annular ligament. In vertical sections through the right vestibule, the base of the stapes was disconnected with the fenestra ovalis, and displaced to the tympanal side; in place of the annular ligament groups of blood and pus corpuscles were seen both at the upper and lower ends of the base of the stapes, but the infiltrated mucous membrane covering the tympanal side was preserved and had probably hindered the complete luxation of the stapes.

Since there was a perforation in the right membrana tympani and purulent exudation at the bottom of the tympanic cavity, and as the history showed that the ear had discharged previously, it might appear doubtful whether the detachment of the stapes had occurred from without inward, or in the contrary direction. According to the first hypothesis the inflammation of the right labyrinth must be considered secondary; the infecting material passed then from the right labyrinth into the cranial cavity, causing there a meningitis, in consequence of which the inflammation was transmitted to the left labyrinth.

On the other hand there is the possibility that there had been a sporadic infection with the poison of cerebro-spinal meningitis, in a patient already suffering with the effects of a purulent otitis media,—that the two processes had developed independently. Accepting the latter supposition, the destruction of the right annular ligament must have occurred from within outward. The latter hypothesis would seem the more probable, since a breaking through from the tympanic side is rare in the ordinary chronic purulent affections of the middle ear, but occurs mostly in connection with caries in the labyrinth wall, which was here excluded. The preservation of the tympanic mucous membrane covering the articulation of the stapes and the fenestra ovalis also argue against this idea. It is further known that cerebro-spinal meningitis, without leaving marked changes in the meninges, sometimes causes a chronic hydrocephalic condition; while the purulent carious processes within the petrous portion of the temporal bone more frequently lead

to subdural abscesses, purulent meningitis, cerebral abscesses, or sinus thrombosis.

It is also of interest to see that with a duration of only fourteen weeks there should have been so complete a filling of portions of the semicircular canals with bony masses, as Fig. 1 shows. Without a microscope it was scarcely possible to follow the course of the semicircular canals on either side, and this observation shows how careful we must be in judging of the ears of deaf-mutes whose previous history is unknown. The reports of the absence of single semicircular canals or of other parts of the labyrinth, which the earlier anatomists regarded for the most part as congenital malformations, may in many cases be explained as being due to inflammatory changes occurring in youth.

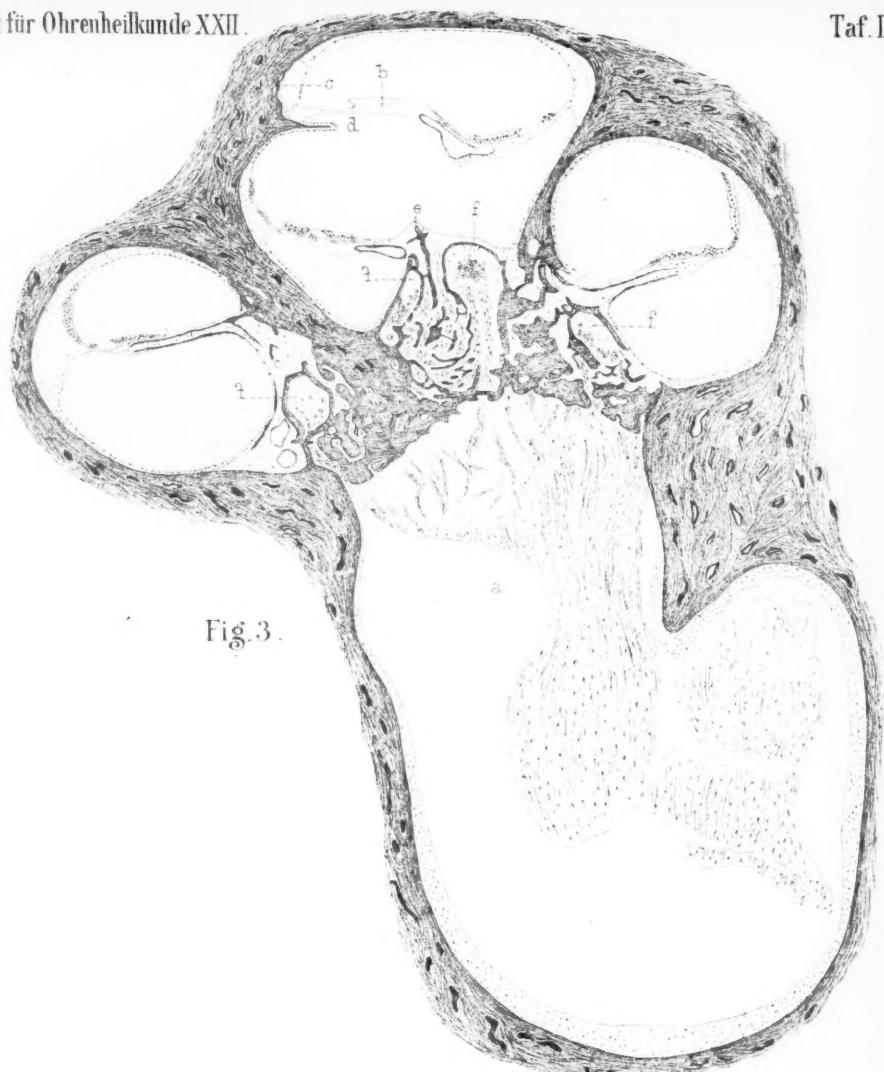


Fig. 3.



Fig. 1.

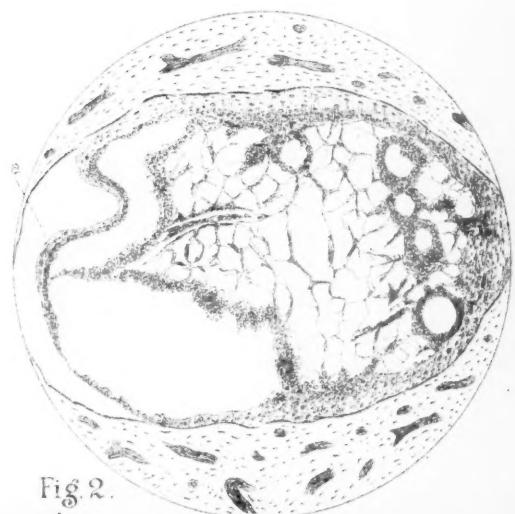
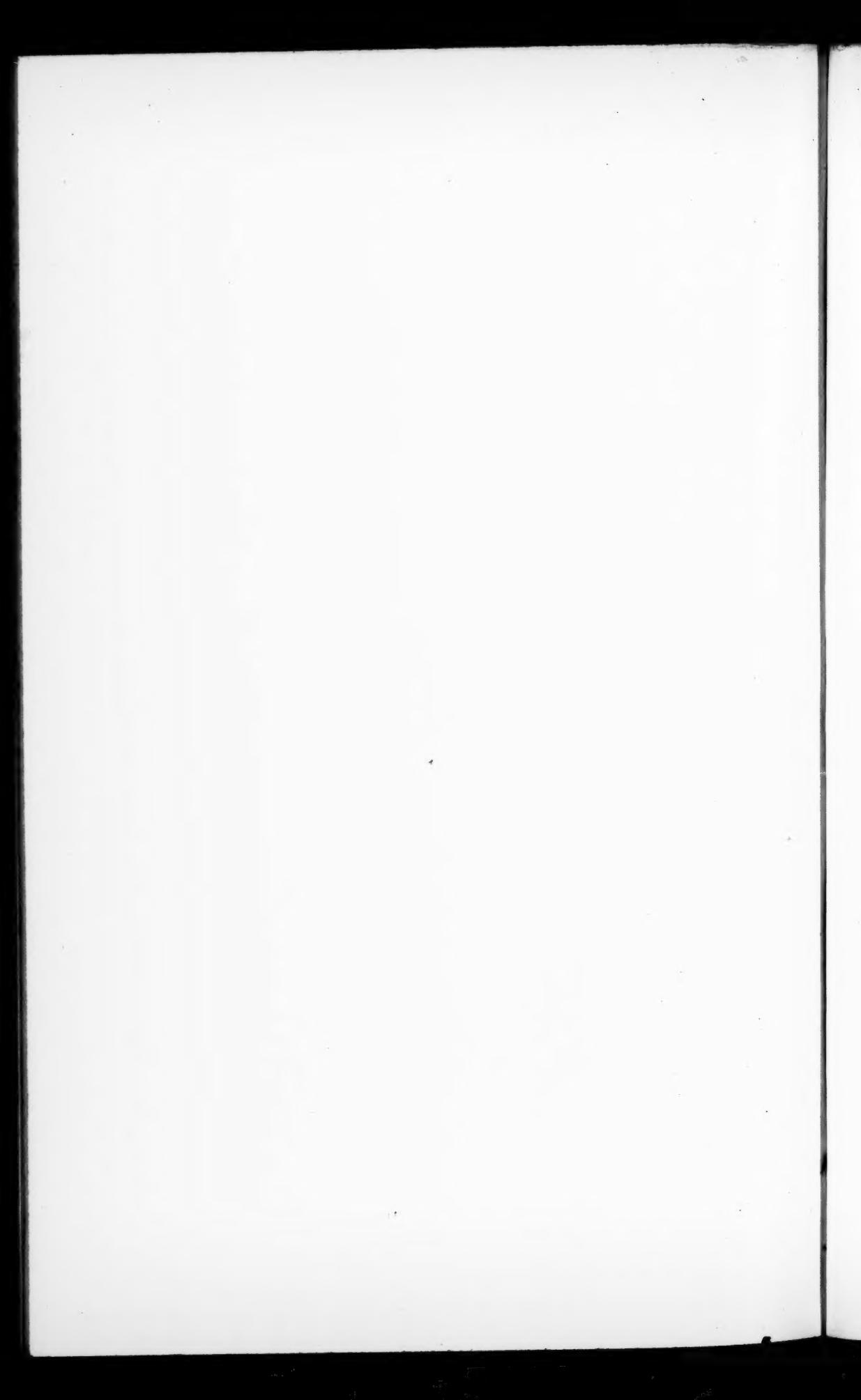


Fig. 2.



A CASE SHOWING EXTENSIVE DESTRUCTION OF THE NERVE IN ALL THE TURNS OF THE COCHLEA.

BY PROF. FR. BEZOLD AND DR. A. SCHEIBE.¹

Translated by Dr. WARD A. HOLDEN, New York.

(*With Fig. 3, Plate III.*)

THE changes to be described here were found in the left ear of a very deaf physician who died at the age of sixty-one. The clinical history was as follows.

A marked deafness in either ear was noticed twenty-three years before his death, and had gradually increased. In his last years, conversation was heard at a few inches with the right ear, but not at all with the left. In the early years of his deafness he had a number of attacks of giddiness without nausea. There were rarely subjective noises. No hereditary element could be discovered.

Six years before the deafness was noticed the patient had a severe basilar meningitis and at about the same time began to take morphine in gradually increasing doses. His life was passed in continued mental activity.

In the last ten years his bones were fractured several times by slight violence, but healed rapidly. At the autopsy the bones of the extremities were found to be very brittle (osteopsathyrosis), and the vertebrae and the spongy part of the petrous portion of the temporal bone were so soft (osteomalacia) that parts of the latter could be cut without being decalcified.

The left ear only was examined.

¹(From the Pathological Institute in Munich). This case was reported briefly and the preparations demonstrated at the sixty-fourth meeting of German naturalists and physicians in Halle, by Dr. Scheibe.

The membrana tympani seen from without was on the whole normal in color and curvature, the reflex was visible, there was a slight injection along the handle of the malleus, at the umbo an opaque spot and a diffuse opacity of the peripheric zone below.

The mucous membrane of the naso-pharyngeal space and of the ostium pharyngeum tubæ, apart from some dilated veins in the roof of the pharynx, was not particularly changed.

In order to test the conducting apparatus, a manometer tube filled with a colored fluid was cemented into the upper semicircular canal in the manner which Bezold has described.¹

Under the pressure of the finger upon the aqueductus cochleæ, as well as upon the porus acusticus internus filled by the two nerves, the fluid in the manometer tube ascended several millimetres and remained at this height. Under pressure upon the aqueductus vestibuli, it rose one millimetre and sank back to its former height.

The transverse sinus and probably also the intradural endolymphatic sac of the aqueductus vestibuli had been opened in the preparation of the specimen.

Variations in aerial pressure in the external canal, the tympanum being unopened, had the following effect. When the rubber tube placed in the canal was blown into and when the letter "P" was sounded directly before the opening of the tube, there was a shade of motion in the labyrinth manometer, the maximum effect with increased pressure being 0.6 mm, and with diminished pressure 1 mm (0.6 and 1.2)²

Increased pressure in the tube caused a rise of 5.5 mm, and decreased pressure a fall of 4 mm (3.7 and 4 mm) in the labyrinth manometer.

When the tegmen tympani was removed, the bone here was found to be fairly thick and composed of spongy vascular substance which was so soft that for the most part it could be removed with the chisel without the aid of the

¹ *Arch. f. Ohrenheilk.*, vol. xvi., "Experimental Studies on the Conducting Apparatus of the Human Ear."

² The figures in parentheses indicate the average values found by Bezold in forty temporal bones manometrically examined. Cf. *Arch. f. Ohrenheilk.*, vol. xvi.

hammer. The ligamentum mallei superius was also removed.

The mucous membrane of the tympanic cavity appeared pale, lustrous, moist, and free from injection. There were no synechiæ, excepting the delicate transparent mucous folds stretching from the short process of the incus to the outer wall, which are usually present. The mucous membrane of the tubes was also of normal appearance.

When the motility of the conducting chain was tested again with the tympanic cavity opened, the maximum with increased pressure was only a trace, the maximum motion in the labyrinth manometer with decreased pressure only 0.13 mm (0.33 and 0.94 mm). From this it is evident that the excursions of the labyrinthine fluid with closed tympanic cavity were due almost entirely to the membrane of the fenestra rotunda, which had shown that it had its normal motility.

A glass rod 10 cm long, cemented to the head of the malleus as an indicator, showed with increased and diminished pressure in the canal a maximum excursion and incursion of 5 and 13 mm (5.9 and 13.4 mm). Cemented in the same manner upon the incus, the indicator showed a maximum of motility of 2.5 and 4 (1.9 and 4.1 mm).

As manometric examination showed no diminished motility, the only conclusion was that the markedly diminished motility of the entire chain was due to a partial fixation of the stapes or of its annular ligament. The stapes showed a slight movement when its head was touched with a probe.

Another case which Bezold¹ examined, showing calcification of the ligamentum annulare stapedis without other changes in the ear, demonstrated that even when manometric motility of the stapes was wanting, a whisper might be heard at a distance of 6 cm , as was found in life.

As the decreased motility of the stapes was not sufficient to explain the deafness in our case, the petrous portion of the temporal bone was hardened, decalcified, imbedded, and

¹ "On the Relation of Bone- and Air-Conduction in Rinne's experiment."—*Aerzl. Intelligenzblatt*, No. 24, 1885.

cut in a series of sections in a direction perpendicular to the long axis of the pyramids.

The membrane of the *fenestra rotunda* was normal, as was also the plate of the stapes and the *ligamentum annulare*, which shows that there may be a diminution of motility at this point without marked changes being found in the decalcified specimen. The remainder of the middle ear so far as examined was normal.

The examination of the labyrinth showed as the principal change a marked deficiency in the number of nerve fibres, in equal degree in all three turns of the cochlea.

The sections showed in the depth of the *meatus auditorius* an ampulla-formed cavity in the position of the *ramus cochlearis*. With the microscope it was seen that only very thin bundles of nerve fibres entered the *tractus foraminulenus* and the *central canal*, and from there passed to the *ganglion spirale*. The small portion of the *ramus cochlearis* that is preserved, shows normal fibres. In the entire course of the *ganglion spirale*, the greater part of the *ganglion cells* are destroyed. In their place in the half of Rosenthal's canal toward the *modiolus* are empty spaces, while in its outer part the *ganglion cells* are apparently unchanged. Beyond the *ganglion spirale*, between the two sheets of the *osseus lamina spiralis*, are a few isolated nerve fibres, and between them a communicating system of cavities extending through all the turns of the cochlea.

Corti's organ is represented in the vestibular portion of the cochlea only by disconnected groups of cells. In the first turn these cells form a small elevation in which none of the normal elements can be recognized. In the greater portion of the second turn, the form of *Corti's organ* has been preserved. At the apex of the cochlea there is no trace of *Corti's organ* nor of the cellular covering of the *lamina spiralis membranacea*.

The remaining parts of the *ductus cochlearis* also show changes. In the vestibular portion of the first turn, *Corti's membrane* is partially adherent to *Reissner's membrane*, and the latter to the *stria vascularis*. *Corti's membrane* is here very short and narrow and is wholly wanting in a por-

tion of the first turn. In the second turn it is normal. Reissner's membrane is only present in the vestibular portion of the cochlea.

The most marked changes are found in the third turn. Here the bony portion is wanting in part. The second turn communicates with the third through a perforation in the bony wall. The perforation reaches internally to the modiolus, externally there is a small rim of bone remaining. The periosteum passes in part from the upper surface of the latter uninterruptedly over the free margin to the lower surface (see Fig.), and in part continues forward in new-formed connective-tissue membranes, which on the one hand extend to the remainder of the lamina spiralis in the third turn, and on the other hand pass to the modiolus, thus forming a membranous septum, not shown in the figure.

The modiolus and the hamulus are also almost altogether wanting in the third turn, but the crista spiralis is fairly well preserved in the upper turn. It appears normal in the other turns, but does not take the stain and no cell nuclei are to be seen (Fig., *b*). The membrana basilaris, the upper half of the ligamentum spirale and the neighboring periosteum are also seen to contain no cells. The stria vascularis and the prominentia spiralis, elsewhere normal, are here represented by a layer of flat epithelium.

Reissner's membrane is also wanting here, and a detached portion of Corti's membrane adheres to the crista spiralis.

The bone of the cochlear capsule, where it is covered by the ligamentum spirale, shows in the third turn a shallow irregular defect (Fig., *c*). In the last portion of the apex turn all the structures of the ductus cochlearis, together with the crista spiralis, are wanting. Attached to the remainder of the hamulus is the new-formed membrane spoken of above.

The vestibule and the semicircular canals, unlike the cochlea, are almost normal. The nerve twig for the ampulla of the upper semicircular canal is partially atrophic. The crista of this ampulla is not well enough shown in the sections to judge of its condition.

CRITICAL REMARKS.

In this labyrinth there was a more marked and extensive atrophy of the ramus cochlearis than has been found, except in the case of a deaf-mute reported by Scheibe¹

The pathogenesis is doubtful. The destructive changes and the development of new tissue, principally in the upper turn, might be referred to the basilar meningitis occurring twenty-nine years previously, but against this argues the fact that the changes were most marked in the third turn and not in the first as was found in all the cases hitherto reported, and further by the fact that the deafness had been noticed for six years only.

The bony defect in the upper portion of the cochlea might be a symptom of the general skeleton affection. But when we remember that the most extensive pathological changes, and particularly the formation of new membranes, took place at this point, it seems more probable that the resorption of the bony cochlea was due to a previous inflammatory process.

Whether the atrophy of the nerve was due to an inflammation of the cochlea, or whether the morphine habit was the cause or whether finally there were senile changes present, cannot be definitely decided until a greater number of histological examinations of the labyrinth shall have given us a wider knowledge of the subject.

Explanation of the Figure.

Section perpendicular to the long axis of the pyramid.

Absence of the nerve fibres and of a greater portion of the ganglion-cells in all three turns.

a. Ampulla-formed cavities in the substance of the cochlear nerves.

b. Crista spiralis with no cells.

c. Superficial defect in the bone; at *d* and *e* defect in the wall between the second and third turns.

f. Ganglion spirale.

¹A case of deaf-mutism with atrophy of the acoustic nerve, etc. This volume, p. 12.

EXCISION OF THE MEMBRANE AND OSSICLES IN SUPPURATIVE DISEASES OF THE ATTIC.¹

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THE object of this paper is the presentation of several cases of operative interference in suppurative disease of the attic, and by their success, aid slightly in the further extension of this operation. Supposing that all are familiar with the history of this operation, so much having been written upon this subject of late, I will not burden you with an extensive *résumé* of the literature. The attic, for the relief of which most of my operations were performed, is separated above from the general tympanic cavity by the short process of the malleus; its external boundary is formed by the outer wall of the tympanic cavity and Shrapnell's membrane; internally it is bounded by the head and neck of the malleus and the anvil; and above by the superior ligament of the malleus. According to Schmiegelow this space is divided into an anterior and a posterior portion, designated cellulæ Shrapnelli and antrum Shrapnelli, thus maintaining an analogy between this space and the mastoid, with its antrum and cells. It is largely due to the cellular structure of the cellulæ Shrapnelli, giving rise to retention of secretion, that inflammations in this region are attended with such unpleasant results.

ÆTILOGY. The want of frequent observation of acute inflammation of the attic, has given rise to some speculation as to the probable cause of localized inflammation in this cavity. Some authorities state that acute inflammation

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in this region is rare ; they evidently refer to absence of the observation of this condition, rather than to its actual occurrence, as all cases must have been acute in some stage of their history. Wolb and his exponents state the involvement of the attic is the active resultant of a furuncular or other inflammatory change within the external auditory canal, extending into this space through a supposed patulus foramen Rivini. Schmiegelow and others claim, with just reason, that the process must be of a tubal origin. As Schmiegelow states: "Why should it be necessary to assume a different manner of development for inflammation in Shrapnell's membrane, than for that in the other forms of middle-ear inflammation. Do we not find that middle-ear inflammations, of whose tubal origin there can be no question, often limit themselves to particular portions of the middle ear?" Two cases which developed under my eyes bear out the tubal origin, or rather negativing an external causative agency of this condition, are worthy of notice. About a year ago I had under my observation a young lady who had quite a severe acute inflammation of the middle-ear cavity which underwent resolution. Shortly after subsidence of all inflammation within the antrum, and the almost complete restoration of hearing, there was, without any apparent cause, the sudden development of acute pain over the mastoid region, and some mild febrile disturbance. Examination of the ear, which had not now for a week been subjected to inspection, revealed the membrane proper, in nearly a normal condition, but just above the short process there was observed a small granule which was evidently, and proved to be, a small polypus protruding through Shrapnell's membrane. Previous to this there had been no suppuration. With removal of the granulation, an exit was given to the purulent discharge. The external auditory canal was in an absolutely normal condition. The patient contracted a severe cold ten days before this occurrence and this evidently rekindled the attic inflammation which had remained dormant since the primary involvement of the whole cavity. The second case of evident tubal origin, the external canal being normal, developed in one of my

operative cases. When this patient came under my observation there was an attic inflammation in the right ear and a retracted membrane on the left side, but no suppuration. For three weeks previous to operation, the left ear was catheterized every alternate day. Ten days after the operation, the patient called my attention to the fact that, since his last visit, he had become very deaf in his left ear. Upon inspection, I was surprised to find the canal partly filled with cheesy pus, the removal of which revealed the existence of a polypoid growth protruding through Shrapnell's membrane. It is evident that the exposure incident to the operative interference produced a tubal catarrh, which gave rise to the implication of the attic. There was no pain; no involvement of the atrium. Patient states that this ear had never suppurred before. These two cases are worthy of note on account of the sole solution of continuity being in Shrapnell's membrane, and their development without any marked subjective symptoms, while the remainder of the membrana tympani was normal excepting the slight injection at the upper portion of the membrane.

Suppurative inflammation in the attic is one of the most obstinate forms of middle-ear affections which the specialist meets. The persistence of the suppuration is largely due to the want of sufficient drainage, and the injurious results brought about by the carious or necrotic involvement of the malleus, incus, and the outer wall of the tympanic cavity. Should there be caries or necrosis of any of the ossicles it is impossible to bring about a restoration of the parts without the exfoliation of the parts involved, or their removal by artificial means. No amount of cleansing, even by the use of intra-tympanic syringes, or instillation of astringents, however well and thoroughly carried out, will bring about the desired result should there be destructive changes in or about the ossicles. In no other region of the body has the general surgical principle, viz., the removal of the offending and diseased part and the establishing of free outlets for pent-up secretion,—been so thoroughly disregarded as in the treatment of these suppurative changes within the middle ear. The dangers arising from prolonged suppuration in

this vicinity cannot be too forcibly insisted upon when we consider the close proximity and minute separation from the cranial cavity, the probable involvement of the mastoid, with its manifold complications, the possibility of septic infection, and the danger of erosion of the carotid artery.

The symptoms giving evidence of this condition are the persistence of an offensive purulent discharge from the ear; the presence of a perforation just above the processus brevis, with more or less loss of hearing; the membrana vibrans may or may not be involved. The presence of necrosis, if existing, can readily be made out by the use of the probe.

The inconvenience and danger to which the patient subjects himself in resorting to this operation, which must always be considered, are of the most insignificant nature. There is no danger in the operation itself, when skilfully done; but there is in this as in all surgical operations of its class, the danger to which one exposes one's self in passing into the unconscious state through the administration of an anæsthetic. There is no pain. My patients have never had administered to them a narcotic, nor have they ever requested the administration of such an agent. They suffer no inconvenience, and on the second day are allowed to move about the house. I do not find it necessary to keep them in bed. There is no febrile disturbance.

THE OPERATION. As hemorrhage is a very annoying factor in this operation, and as a succulent and congested membrana tensa is usually the provider of this blood, I usually prefer to put my patients through a short course of preliminary treatment before subjecting them to operative interference. During the prolonged suppuration, the purulent discharge has been gravitating down and over the surface of the membrane, thus irritating it and giving rise to a chronic myringitis, as often evidenced by the succulent and hemorrhagic condition of the membrane. In these cases I usually resort to a daily thorough cleansing of the cavity and the after use of astringent applications, until the membrana tensa shows less evidence of congestion. On the day of the operation, the patient is prepared, as is usual in

operative cases, and, in addition, immediately before the operation, the ear is well cleansed with a mild antiseptic solution. As the patient must be absolutely still, it becomes necessary to resort to general anaesthesia. Good light is also an indispensable adjunct to the success of the undertaking. I prefer ether, which is *inflammable*; being an adherent to that opinion shared by the mass of practitioners, that administration of chloroform is absolutely unjustifiable. The use of ether deprives us of all forms of light producing a flame. We must, therefore resort to the use of either reflected sunlight or electricity. We can place little dependence upon sunlight. In order to make use of the sun, we must only operate upon an absolutely cloudless day; small clouds occasionally obscuring the light prove very annoying and embarrassing to the operator. The frequent waiting and delays from day to day, in order to obtain the necessary light, proves distressing to the nerves of the patient, however much of a stoic he may be. Sunlight when obtained is cheap and all-sufficient. I have operated with no other light. In this vicinity a day or two of storm is frequently followed by one or more of cloudless heavens. I usually resort to the expedient of allowing two bad days to pass, and then appoint the third for my operation, and so far have been blessed with five successes and one failure. A broad, high window with good southern exposure is essential. The electric light is the light par excellence and the Sexton lamp, made by the River and Rail Company, is the best means of using it. The electric light requires the use of a small portable storage battery and the necessary charging cells. This light requires no postponements, but is expensive. Where one has many of these operations to do it would be far preferable to use the electric light.

The *modus operandi* of this delicate surgical procedure varies according to the exigencies of the case. In this operation, as performed by Sexton and Burnett, the incision is carried from the perforation, with a flat probe-point knife around the circumference of the membrane, thus severing the membrane from its attachment to the tympanic ring. The posterior flap is then thrown forward, and the now

exposed incudo-stapedial articulation is separated by the narrow rectangular knife. The incus is now grasped by forceps, and gently but firmly drawn down and outwards, and removed from the tympanic cavity. The third step is accomplished by passing the trowel-shaped knife below the short process of the malleus and dividing the tensor tendon and ligamentous bands holding it in position, and it in turn is grasped above the short process, and extracted with the remnants of the membrane. Noting in my first cases, that a complete regeneration of the membrane always followed, caused me to pursue a different method in my subsequent operative procedure. In these latter cases I transfixated the membrane just below the short process, with the trowel-shaped knife, dividing the tendon of the tensor tympani and other ligamentous attachments of the ossicles in the attic. In withdrawing the knife, I divided the membrane along the posterior border of the manubrium. A similar incision is made along the anterior border of the manubrium from the perforation to the umbo. The malleus is now removed. The incus is then examined, and, if found to be diseased, the posterior flap is thrown back against the posterior wall of the canal which exposes the incudo-stapedial joint which is divided and the incus extracted. The posterior flap is drawn forward, and the operation is complete. By these means, less injury is done to the membrane and a quicker resolution is sure to follow. The canal should now be cleared of blood by gentle syringing with warm antiseptic solution, and the canal closed with a wad of absorbent cotton impregnated with iodoform.

The advantages in favor of this operation are legion, the ill-effects none. It belongs to that class of cases in which we might well say that if we do no good, we do no harm. Even if the discharge does not cease within a few weeks, we have gained much by the interference. The offending cause of the continuous suppuration is removed, the character of the discharge is changed and its quantity lessened, vertigo ceases, hearing occasionally improves, tinnitus disappears, all possible danger of involving contiguous cavities is avoided, and the seat of the disease is more accessible. Hemorrhage

is a very annoying feature in this operation. It only requires a few drops of blood to obscure the fundus of the ear and interfere with further procedure. The blood must be mopped up with absorbent cotton, or syringed out with very warm water. Sometimes the blood flows quite profusely, the canal filling up quite as rapidly as it is removed by mopping or syringing. These cases prove very vexatious and require great patience. After the hemorrhage has been checked, I find it wise to instil a few drops of a ten per cent. solution of cocaine before proceeding. Hemorrhage has never given me any inconvenience after the instillation. I would only advocate the use of cocaine where the hemorrhage was annoying, because I imagine that the marked shock following the operation in the cases in which I used it was more the effect of the constitutional action of the cocaine than anything else. It is hardly necessary for me to state that this operation is difficult, requires skill and manipulative dexterity and a thorough anatomical knowledge of the relations of the parts affected.

CASE 1.—A young man, twenty years of age. Suppurative disease of both attics since early childhood. No knowledge of cause, but supposes it to be habit he had while a child of filling the ear with bits of paper. Profuse, offensive discharge, tinnitus, and frequent earache. Conversational voice heard at five feet. Subjected to much treatment. Right ear healed by careful cleansing and topical applications. Left ear showed necrosis of malleus and I excised the bone. Two weeks after excision, suppuration ceased and patient still continues in good condition. Subjective symptoms all improved. Hearing at eleven feet. This patient took ether badly. Three weeks after operation reported, stating that he had suffered from severe headache for several days and noticed that lower extremities were swollen. On questioning, found that he had voided scarcely any urine for forty-eight hours. Under Dr. Bayne's care he rapidly recovered from the attack of acute nephritis. Had never had symptoms of Bright's disease before. Was it due to the ether?

CASE 2.—A girl, sixteen years of age. Suppuration of an offensive character, quite profuse, from an attic perforation of many years' standing. Cause not known. Membrane retracted. Hear-

ing of voice three inches. Excision of malleus and incus. Suppuration ceased in two months. No improvement of hearing.

CASE 3.—A young man. Medical student. Suppurative disease of right attic. Discharge profuse and offensive. Said to be the result of an acute inflammation of five years ago, since which time the ear has been discharging continuously. Was under treatment most of the time. Every known agent used to aid resolution. Left membrane greatly contracted and dull in color. Hearing distance—Right, 4-20 ; Left 6-20. Advised excision and left ear inflated by catheter. Malleus alone found diseased and excised. This was the first case in which the membrane was not excised. Suppuration ceased in three weeks. As I was about to discharge patient, he called my attention to deafness in left ear, which had now begun to suppurate. It required two months' treatment to conquer this condition. Hearing worse in left ear, about the same in right.

CASE 4.—A man of thirty dates his ear trouble to scarlet fever, contracted during his tenth year. Left ear affected. Profuse offensive discharge, intense tinnitus ; and occasional vertigo. Had had several growths removed. Hemorrhage was a frequent occurrence, so often, and of such quantities, as to prove annoying and alarming. The membrana tensa was very succulent and congested in this case ; and the profuse hemorrhage caused considerable inconvenience and embarrassment during the operation. Hearing 6-20, not improved by the operation. Both bones were greatly necrosed ; almost free from all attachments. This case is still under treatment, after four months, but has greatly improved, and I hope soon to record it among my successes. The discharge has greatly lessened and is no longer offensive ; the subjective symptoms have all disappeared ; and the hemorrhages are a thing of the past.

CASE 5.—A young woman of thirty-five. Has had a chronic purulent discharge from left ear since infancy. Had been subjected to treatment of all kinds and character, regulars, quacks and homeopathists, both at home and abroad, without result. Had a perforation of an oval shape about four millimetres in diameter, situated in the lower half of the membrane and involving the umbo. A small polypoid growth was attached to the upper part of the membrane, which, she states, had been removed ten or more times. Discharge quite profuse and offensive. After re-

moval of polypus, upper and posterior borders of perforation were found adherent to promontory. Hearing only of loud tones, almost on contact. Necrosis of tip of malleus diagnosticated and excision advised. The excised malleus presented condition expected. Profuse watery discharge occurred for several days after operation until the tenth day, when discharge ceased, and the patient was discharged cured. Hearing distance for ordinary conversation, five feet. This last case does not belong to this class of cases but is of sufficient interest to be here reported.

In conclusion, I will simply add the conclusion made by Dr. C. H. Burnett in his paper upon this subject read before the American Medical Association at its last meeting in this city.

"The operation has not failed to stop suppuration, or greatly diminished it, in all cases of chronic purulent otitis media in which the writer has applied it.

"2. In attic cases with normal atrium, the sole perforation being in the membrana flaccida, this operation is the only means of cure.

"3. By this operation, in cases of chronic purulent otitis media, in which the sole perforation is in the membrana tensa and is comparatively small, and while the purulency is limited to the anterior part of the drum cavity, the suppuration is promptly checked, before it has had an opportunity to attack the posterior portion of the drum cavity. Thus mastoid inflammation and necrosis, sinus thrombosis, pyæmia and cerebral abscess are prevented.

"4. If any hearing exists before the operation, it (frequently) invariably improves after the excision.

"5. Vertigo, headache, tinnitus, and the ordinary attacks of earache from 'gatherings,' so common in chronic otorrhœa in children, are entirely and permanently relieved by the excision of the necrotic remnants of the membrana tympani, and the two larger ossicles."

A CASE OF SINUS THROMBOSIS, ATTENDED WITH REMARKABLE OCULAR SYMPTOMS.

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ON March 25, 1892, I met at the Shooter's Hill Cottage Hospital, Drs. Wise, Smith, and Sidney Worthington, regarding the following case which presented some striking clinical phenomena.

The patient, a man aged thirty-five, had long suffered from right otorrhœa. He came under Mr. Wise's observation on March 12th, previous to which he had been under medical treatment for what had been considered an attack of influenza. Mr. Wise recognized that the patient was seriously ill, with pains in the head, fever, and occasional rigors, but there was no sickness. The right eyeball was more prominent than the left. There was a purulent discharge from the right ear with considerable pain and discomfort. Dr. Mitchell Bruce saw the patient in consultation on the 13th, and advised surgical interference, which unfortunately was absolutely declined. On March 14th, complete right ptosis was present, but this improved, and three days later, left ptosis appeared, which has since persisted. Slight right facial paralysis was also now noticed. The intellect remained fairly clear, but there were occasional fits of wandering and slight delirium. The temperature throughout was of the pyæmic type.

On examination, I found a man of powerful frame, emaciated, with a sallow icteric skin, evidently in a condition of desperate illness. He lay supine, with a dry cracked brown tongue, in a lethargic and drowsy state. A most remarkable feature in the aspect of the patient was the extraordinary protrusion of both eyeballs. Indeed, at first sight, one might have well pronounced

the man to have been suffering from double sarcomatous tumors pushing forward the eyeballs. The lids were greatly engorged, the veins in them unduly prominent. On the left side the prominent eyeball was partly concealed by the drooping lid. The left pupil was greatly dilated, fixed, and not acting to light. There was no strabismus. On examination with the ophthalmoscope well-marked optic neuritis was found to be present. Near the root of the nose was a hardly perceptible red streak ; on passing the finger lightly over this, a thrombosed vein was plainly detected. From the right ear issued an abundant offensive discharge. The membrane was entirely destroyed, and exuberant granulations were seen towards the inner wall of the tympanum. There was no oedema or tenderness over the mastoid, but there was distinct fulness and local tenderness over the region of the internal jugular vein in its upper part. Owing to the illness of the patient the back of the chest was not examined, but the man breathed easily, and nothing abnormal could be detected anteriorly. There was no implication of the joints, no petechial rashes on the skin, no tender spots on palpation of the muscular parts of the limbs. The patient could distinguish those about him ; his intelligence seemed good ; he gave his address promptly, and answered questions without manifesting that sluggish cerebration so commonly observed in cerebral abscess. This was remarkable considering the serious pathological conditions obviously present.

No operative treatment was advised and the patient died comatose on the first of April. The thrombosed vein at the root of the nose suppurated just before his decease.

I refused operative treatment upon the following considerations.

The extraordinary protrusion of the eyeballs was certainly dependent upon venous engorgement. This was due to blocking of the cavernous sinuses by clot, which extended by way of the petrosal and transverse sinuses, from the right lateral sinus. The angular and frontal veins were also thrombosed. The evident implication of the third nerve on the left side was due to pressure in the cavernous sinus. The right facial paralysis, was due to direct implication of the trunk of the seventh nerve in the aqueduct of Fallopius. The origin of the mischief was caries of the right mastoid and thrombosis of the lateral sinus. The marked implica-

tion of the jugular rendered systemic infection likely. The sinuses at the base of the brain being filled with septic clots, the meninges could not fail to participate in the inflammation. The condition of desperate illness was much against the operation of tying the jugular vein, and opening the lateral sinus; such a proceeding could hardly have improved matters in such a hopeless case.

Permission was obtained with some difficulty to examine the head *post-mortem*. The following is a copy of the letter kindly sent me by Dr. Worthington, who made the autopsy.

"The post-mortem to-day showed just the condition that you anticipated. After you saw him suppuration occurred about the frontal vein, and about two drachms of pus discharged about the inner canthus. Then he had one or two minor rigors, became unconscious and died. There were three small abscesses the size of a pea on the cerebral cortex, and a fourth in the right corpus striatum, all evidently secondary (embolic). The ophthalmic veins were full of firm thrombus; the cavernous sinuses full of pus, also the right petrosal sinus. The right lateral sinus contained pus and clot; the bone adjacent was rough and infiltrated with pus; the adjacent surface of the cerebellum and medulla coated with purulent lymph. The superior longitudinal sinus was normal. The chest and abdomen were not examined as we only had permission to open the head."

The chief points of interest in this case are the remarkable ocular symptoms which occurred early and which were certainly difficult to explain. The fact of the patient living so long is also of interest, as affording an additional argument for early operation in these cases. Had the jugular vein and right lateral sinus been opened and irrigated early, the recovery of this man would have been very probable. In the ordinary accounts of lateral sinus thrombosis and sinus pyæmia, no mention is made of the possibility of occurrence of thrombosis of the cavernous sinus and protrusion of the eyeballs. Cases of sinus thrombosis due to caries of the mastoid remind one forcibly of the pathological conditions observed in "phlegmasia alba dolens" due to septic matters entering the iliac veins.

Thrombosis of the cavernous sinus is not a common affection. At the Medical Society of London on March 26, 1886, Mr. Gould brought forward a case resulting from alveolar abscess. Other cases have been related due to extreme anæmia in young girls, necrosis of the bones of the nose, fractures of the skull, and such affections of the face as carbuncle. The ear is so far removed from the eye, that it seems, at first sight, unlikely that caries of the mastoid could produce thrombosis within the orbit. The case related, however, illustrates this important fact—important to the aural surgeon, the oculist, and the physician. The signs and symptoms of sinus pyæmia have lately received full recognition and I need not repeat them; I would add to the list the possibility of exophthalmus, unilateral and bilateral. The literature of diseases of the ear takes but scant notice of cases of cavernous sinus thrombosis. Politzer refers to its possibility and quotes two cases where he saw the morbid preparations, and lays stress upon the curious and complicated symptoms that are apt to arise. He mentions exophthalmus, ptosis, and various oculo-motor paralyses. Most of the more recent writers on aural diseases, however, do not even mention the subject. In the general literature of thrombosis of the cerebral sinuses, also, cavernous sinus implication is not much discussed.

The object of relating this case is to call attention to the fact, that early thrombosis of the cavernous sinus may give rise to curious and diverse ocular phenomena, which may in their turn be dependent upon disease of the petrous or mastoid bone. This consideration is as interesting to the ophthalmic as to the aural surgeon, and adds another symptom for consideration to the group generally related by authors as characteristic of sinus thrombosis in diseases of the ear.

ON THE CONNECTION BETWEEN DISEASES OF THE NOSE AND NASO-PHARYNX AND SOME DISEASES OF THE EYE AND EAR.

BY DR. J. A. SPALDING, PORTLAND, ME.

IT is sometimes difficult for one who makes a specialty of diseases of the eye and ear to help his patients unless he is thoroughly competent to treat diseases of the nose and naso-pharynx. To a certain extent, also, he should be able to examine the larynx, for if he can tell whether it is diseased or not he can make a skilful diagnosis between affections of the naso-pharynx (which are largely connected with diseases of the ear) and those exclusively of the larynx.

I have had under my care, of late, a case of deep stricture of the lachrymal duct, in which no appreciable improvement could be obtained until hypertrophies of the turbinated bone on the same side had been successfully treated with chromic acid. When this had been accomplished, the lachrymation significantly decreased, and soon ceased. Owing to an oversight of these conditions in the nostril, the case had long been treated in vain by competent men. It is not every case that is so brilliantly successful, but it shall serve as an introduction to this paper.

Whilst meditating over this article I received from a noted aurist in London a series of questions asking if there were any connection between hypertrophy of the turbinated bones and deafness, and if the treatment or the removal of this state of affairs in the nose were not generally followed by marked improvement in the aural symptoms.

I replied that I had seen several patients in whom tinnitus and deafness had been associated with nasal hypertro-

phies and that after cauterization with acids much improvement in the condition of the ears had been observed. But that this could not be exclusively referred to the treatment of the nasal affection, because, together with this, careful attention had been paid to the ears. Still the benefit being on the whole greater than I had often seen after treatment of the ears alone, it was undoubtedly true that the care of the nose had contributed largely to the rapid improvement in the hearing. Finally it was my opinion that just as good results might be obtained by the use of acids, as by instrumental removal of the hypertrophies.

This recent case of lachrymation relieved by paying attention to the nose, and the receipt of this communication from London, are my reasons for bringing up for discussion the connection between diseases of the nose and nasopharynx and some diseases of the eye and ear.

Let us first insist that a large number of cases of stricture of the lachrymal passages are solely due to the extension of a catarrhal condition of the mucosa of the nose to that of the lachrymal duct, and that it is well-nigh impossible to treat with any degree of success the lachrymation without fortifying the local treatment (probes, styles, astringents, antiseptics, etc.) with care for the nasal mucosa.

How interesting here it is to note how a patient from the country with diseased tear-passages begins to improve with the change of air from that of the country to that of the sea, showing that the theory of the connection between the condition of the nose and that of the eye is not so far amiss as some might be inclined to think at first sight. Hence in the improvement on changing the patient's locality we find our starting-point for the rational treatment of the lachrymation. That is to say, the lachrymation often decreases under changed surroundings before we may have done much for the treatment of the patient, a point which the competent observer will not fail to grasp and to utilize at once.

Again, patients occasionally consult the oculist for dull pain around or above the eyes. Here we often find that the eyes are not at fault, the trouble lying in the extension of a rhinitis into the cavities above the eyes, and in direct con-

nection with the nostrils. In such cases we are to exclude errors of refraction, or possible abnormalities in the muscles of the eyes, whereupon we can confidently advance to the treatment of the catarrh which we are sure to discover under such circumstances.

Still another set of cases, with this same nasal connection, is that of obstinate ulceration or abscess of the cornea in country patients in the fall of the year, where a barb of grain has grazed the cornea. If there is the least tendency to lachrymation the muco-pus from the occluded sac wells up over the cornea, the bacteria invade that tissue, and in many cases the eye is irretrievably destroyed.

Finally, I may quote that very rare and perhaps doubtful case reported by Coretoux (*Annales d'Oculistique*, Nov., 1891), in which a patient with serous iritis was not at all benefited by merely local treatment to the eye, till this was abetted with the application of the actual cautery to the ozænic nostrils.

The same author mentions cases of conjunctivitis in which after careful treatment had failed, cauterization of the PHARYNX was followed by a distinct amelioration in the conjunctiva. He insists that all conjunctival diseases which show a tendency to encroach upon the cornea are of nasal origin. And in concluding he suggests: that the proof of naso-pharyngeal origin of many eye diseases is demonstrated by the cure of the latter after solely treating the naso-pharynx by the fact that some are only cured by treating both the eye and the naso-pharynx; and finally that where the nose cannot be successfully treated owing to abnormalities, or where its treatment is neglected, local remedies to the eye are of but little use.

Having thus established the fact, that there can be no reasonable doubt of a connection between some diseases of the eye and the nose, it is proper for us to pass in brief review the best means by which to bring about a rapid cure in such cases. Afterwards we may return to the better established connection between the naso-pharynx and the ear.

Leaving aside for a while hypertrophies of the turbinate bodies, we may assert, without fear of contradiction, that

nasal catarrh in its various types is incurable in a New England climate, incurable in the strict sense of the word, as when we say a patient has been cured of a fever so that he goes about apparently as well as ever, or he has been cured of an iritis, in the sense that the eye is perfectly restored to its functions, and has suffered no deterioration of vision. Now we cannot say this of catarrh in our climate. The fact that new remedies are being continually urged upon our notice, is proof that nothing so far discovered has been of permanent value. Nevertheless, as it is this disease which causes the diseases of the eye to which we are now referring, we must say a few words on the general principles upon which catarrh must be treated if we hope to be of assistance to the eye. Of course it is not every case of catarrh in which there is a lachrymation of the eyes, but on the contrary there can be no doubt that in almost every lachrymating eye there exists a more or less catarrhal condition of the nasal mucous membrane. Hence in every case of lachrymation we should first consider the refraction of the eyes, then the condition of the conjunctiva and cornea, then that of the puncta and canal. Next we resort to probes, and finish the examination with a minute inspection of the nostrils. Now if treatment of the latter is necessary we cannot hand over our patients to a rhinologist, and thus compel them to the double expense of a visit for the passage of the probe and another for the treatment of the nose, but we must, as all reasonable persons will allow, know what to do ourselves.

It is not my purpose to enter here on a prolonged discussion of the proper treatment of the diseases of the nose, but I may venture to suggest the line that will be of the greatest benefit in these especial cases.

In simple chronic rhinitis we must insist on proper cleanliness of the parts, washing them out with a solution of bicarbonate or borate of soda and glycerine, and various aseptics. Or we may use Seiler's tablets which being dissolved in hot water can be passed through the nostrils with some appropriate instrument. Then we resort to sprays of benzoinol with various essential oils, or to a combination of

benzoinol with aristol, or to the use of iodine with the iodide of potassium or to the chlorate of ammonium, or the permanganate of potassium. In fact, the remedies are innumerable. But it seems to me that finely atomized sprays, are best in common rhinitis, the iodine in the slightly hypertrophic conditions, and if there are crusts, they can be removed and the underlying surfaces treated with powders, or various acids, or astringents, amongst which the preparations of zinc are at present much thought of. Solutions of the bichloride are often available, and the same may be said of iodoform.

Powders are occasionally useful, but they are rather dirty. They are to be tried when other remedies fail. We may thus use calomel, alum, morphia, bismuth, or iodoform, and I have seen cases in which nitrate of silver in lycopodium powder proved very available. But the cases in which silver is appropriate must be picked. On the whole, we get the best results from liquids, because they can penetrate into every cranny and fissure, whilst powders only attain the parts that they directly touch.

Some practitioners resort to caustics in common rhinitis, but these may generally be better reserved for those cases of distinct hypertrophy in which the probe visibly sinks into the swollen mucous membrane.

Whenever a lachrymating eye is accompanied with moderate hypertrophy in the same nostril, and caustics do not seem especially indicated, I have found great benefit from the daily use of a Goodwillie nasal bougie. Even where there is no hypertrophy, but simply a contraction of the nostrils, congenital or otherwise, it is well to try this simple means of enlarging the nasal passages. It is not painful, but to nice persons it is somewhat disagreeable.

Medicated bougies are also highly praised, and these may be tried when other remedies fail to relieve.

If the nasal disease is one of actually enlarged, turgescent, swollen, and yielding hypertrophies, surgical interference becomes a necessity. After carefully cleansing the parts, they are to be cauterized, with various acids, or actually removed with the snare or galvano-cautery, or with the galvano-

cautery knife. Nitric, glacial acetic, and chromic acids are the ones most commonly employed, and there is but little to choose between them, the only caution necessary being not to cauterize too extensively at any one session lest severe constitutional symptoms supervene. For this reason I have generally favored chromic acid, but it is said that the galvano-cautery is far safer than any acids. This, as we learn from the authorities, ought to be used red-hot, for if only black the pain is intense, and if white-hot there is some risk of abundant hemorrhage.

If the nasal douche is employed in cases of catarrh, the greatest care should be given to having the water warm enough and not too salt, and more important still, the hot-water reservoir ought not to be raised too far above the head, lest the force of the stream cause irritating fluid to enter the middle ear, and excite inflammation which may be difficult to cure. On the whole the use of the nasal douche ought to be avoided, and the patient at all events should be most carefully instructed in its use.

One word in regard to cotton tampons lately advised in the treatment of catarrh: Do not let them remain too long lest they excite inflammation of the mucosa that may extend to the middle ear and endanger the hearing. Nor should the practitioner of general medicine feel hurt, if we mention here that, after plugging the posterior nares for obstinate epistaxis, the plug should not be allowed to remain too long *in situ* for the same reason as above mentioned, as cases in recent otological journals sufficiently prove. Thus Gellé at a recent meeting of the Parisian Society of Laryngologists, mentioned a case of serious otitis suppurativa appearing on the second day after plugging the nares, and on the fourth day the nose and external meatus of the ear were flowing abundantly with pus.

But we are delaying too much over details, and the most important part of our paper has not yet been reached; by this I mean the significant connection between diseases of the naso-pharynx and those of the ear.

Although, as we have seen, it is asserted that diseases of the pharynx *often* excite diseases of the eyes, such claims

seem to me to be rather doubtful. There is, however, no doubt that this *occasionally* takes place.

When however, we come to the diseases of the ear, we find that difficulties in the naso-pharynx are in a vast majority of patients the sole cause of the disturbance. Indeed we may assert that almost every one of the diseases of the middle ear owes its origin to some inflammatory disturbance in the mucosa of the naso-pharynx, extending through the tubes into the tympanum. When we reflect additionally, that nine-tenths of the usual diseases for which the aurist is consulted are located in the middle ear, and that almost every case of deafness is due to some disturbance in the naso-pharynx, it is plain that the aurist must, as a part of common-sense education, know something about the naso-pharynx, if he expects to maintain the confidence of his patients, to say nothing of relieving them of their deafness. The truth of this is visible in the attention given in every otological journal to the department concerning the naso-pharynx and its diseases.

If the rhinologist were to claim that these throat patients ought to be referred to him, the aurist would have but little to do, for so-called "throat deafness" composes about nine-tenths of all the patients that the aurist is called to prescribe for.

Let us here look for a moment at those cases of acute otitis media occurring during the course of the exanthemata. Since the aurist rarely sees such patients till long after the drumhead has been ruptured, and the meatus filled with pus, I need not lay much stress on the connection between the naso-pharynx and the middle ear, for it is too plain to be disputed, nor upon the treatment of the same in the early stages. The physician is busy with the bodily state of the patient, who is often seriously ill, and the ear is neglected. Much stress has been laid in many medical journals on the duty of the physician in such cases, and he is often blamed for not calling a consultation. It seems to me, however, that I can recall a large number of patients with *spontaneous* cure of suppuration from the middle ear, with perfect restoration of the hearing. For this reason I

fail to see the need of the persistence with which the charge of neglect is brought by the specialist against the general practitioner. Although of course it would seem to be a necessity to perforate the drumhead artificially, so as to liberate the pus, yet it may be replied that we see cases in which this has been done *secundum artem*, yet the patient remains more or less deaf. But really the question whether or not the hearing is to be affected after the exanthemata, does not so much depend on the perforation of the drumhead, as upon the action of the pus on the ossicles. If so abundant as to bury these deeply, then the delicate articulations, and consequently the hearing, suffer, whilst if caries ensues as the result of prolonged neglect, the ossicles may be seriously injured and enormous loss of hearing ensue.

In a scientific point of view, it would be better to have consultations, but as the drumhead may not be ready to perforate at the precise time of the consultation, or may previously have perforated, the resulting loss of hearing will be the same so far as the actual consultation is concerned. Once perforated, however, no means should be neglected to bring about a rapid cure. For this there is nothing more efficient than the alcoholic treatment. This consists in the use of a supersaturated solution of boric acid in equal parts of alcohol and water, or pure alcohol. This is to be warmed, and poured once or twice daily into the ear. As the discharge thins out, use the lotion less often. Some patients recover more rapidly after resorting to the *dry treatment*, which consists in filling and keeping full the meatus with finely desiccated boric acid. As the discharge wets the powder, use more. It may be poured into the passage from a spoon and then pushed in with a bit of cotton on a wire. More cases can be cured by this method than by any other. Occasionally it has been brought into disrepute by the powder hardening in the meatus and causing pain. But if we syringe out the meatus as soon as this symptom declares itself, and then push in more acid, the pain disappears. If the pain recurs, some other treatment may be tried, such as simple astringents, or the alcohol as above mentioned.

The prevalent influenza often attacks the ear, and a simi-

lar condition of things is witnessed as after the exanthemata. On the whole the pain in the otitis of influenza is in my experience more severe than that during the exanthematous ear diseases.

The greatest proportion of disease of the middle ear attaches itself to the ordinary chronic catarrh of the middle ear, the common type of deafness all the world over. Nine tenths of the cases of deafness that we meet with are due to this form of disease. It begins with a dryness of the mucosa of the tympanum, then of the mucous layer of the drumhead, gradually the articulations of the ossicles become stiff, and the movements of the stapes in its window limited. Together with a dryness of the mucous layer of the drumhead, we have contraction of its delicate structure, so that it can no longer vibrate with facility; the hearing first diminishes for distance, then for public speaking, and finally for ordinary conversation. It is no exaggeration to assert that almost every case of this sort originates in some catarrhal condition of the naso-pharynx. Not that every patient with catarrh of the ear is affected with the ordinary nasal catarrh. Far from this. Still the mucous membrane of all these patients is more or less irritable. They take cold easily, they suffer from tinnitus long before any loss of hearing is observed; they often perceive a sensation of fulness in the ear, and they are very susceptible to sore throats.

When such patients consult us one of the first necessities is to examine the naso-pharynx. We must see if the mucous membrane is normal, if it is smooth or ragged, if the tonsils are enlarged, if the uvula is elongated, and generally if the pharynx is affected. How is the aurist to know if these conditions are normal unless by constant observation and study? And there lies the essence of this paper: that both the oculist and the aurist must from sheer necessity be, if not actual specialists in diseases of the naso-pharynx, at least skilled students in the diseases of this region before they can practise their specialty. They must know about these diseases, only calling in a consultation when surgical interference seems advisable, as in polypi, exostoses, enchondromata, tumors generally, and in deviations of the septum.

Having determined what to do for the ear, we must add the proper treatment for the naso-pharynx, and here a few suggestions may be offered. In posterior naso-pharyngitis we use a cleansing solution as before suggested in speaking of nasal catarrh. Oxide of zinc or nitrate of silver powders may follow, or others, depending on the idiosyncrasies of the case. If there are crusts, they must be removed, and the underlying surface treated with glycerite of carbolized iodine, or sulphate of copper, or acetate of lead, etc.

It is generally well to direct the internal use of tonics, or alteratives in connection with the local treatment.

We often find great benefit in these cases by passing through the nostrils, and then causing the patients to blow them out of the mouth, various vapors such as those of menthol, thymol, aristol, etc., in albolene or benzoinol. Aristol I have lately used with considerable benefit, but it will take time to decide if it has any advantages over other remedies. Where the patient can force the vapor back through the pharynx and so out of the nose, as does the tobacco smoker, it ought to be tried, as thus the parts will be more thoroughly treated.

Adenoid vegetations should be scraped or cauterized with acids or the galvano-cautery. The variety of instruments suggested proves that no perfect one has yet been devised. In the removal of these vegetations we are warned of the dangers of hemorrhages, but it is possible that these are the exaggerations of the specialist. When the vegetations are small and flat, they may be touched with the galvano-cautery, the hot wire being employed over a small surface at a time. The result of the removal of the vegetations so far as the hearing is concerned is generally good. I have seen patients in whom the operation had been done without relief to the hearing, which was however obtained on resorting to the bag and catheter, which proves that, generally, the treatment of the vegetations and the ear should go hand in hand.

When the tonsils are so large as to impinge upon the tubal orifices, or if they are so swollen as to reduce the pharyngeal orifice, they should be removed. I will not at this place enter into a discussion of the question of abscising

the tonsils with the knife, or of repeatedly touching them with the cautery, but I will suggest that few patients will submit to repeated operations, when the tonsils can be removed at one session by an operation which they have always understood is perfectly safe.

Gargles are often recommended in cases of deafness in chronic or acute pharyngitis, but gargling can only be done effectually by partially swallowing the substance and then regurgitating it, in which case the entire pharynx is wet with the gargle employed. Generally it is best to apply the desired remedy with a brush. The old remedy glycerotannin is very useful here, and can be relied upon as a change at any time.

Many cases of sore throat, insidiously creeping into the middle ear, and leaving traces behind in loss of hearing, are reflex in their origin, proceeding from wet feet or an overloaded stomach, or from constipation. Such attacks can often be aborted by the use of a cathartic. Patients so afflicted should be urged to keep their feet dry, and to dry them as soon as possible after once being wet. The best local application is the nitrate of silver in a twenty-grain solution. Weaker solutions are of no value, and even stronger may be used without risk, if not too abundantly employed, in which case they may flow into the larynx and excite a dangerous spasm.

We may pass over by mere mention, the diagnosis or treatment of acute tonsillitis, syphilitic or tubercular pharyngitis, and many diseases in this region, because they have no connection with diseases of the eye or ear.

Let us in conclusion turn our attention to the larynx.

Just as the oculist ought to understand the anatomy and normal conditions of the mucosa of the nose, in order to enable him to treat understandingly a number of diseases of the eye, and as the aurist should know much about the naso-pharynx in order to comprehend the significance of certain diseases of the ear, so in my opinion both oculist and aurist ought to know something about the normal relations of the larynx. Thus the aurist, in a case of apparent pharyngitis with deafness, ought to know that the case is not

actually one of tubercular laryngitis; and the oculist, in a case of weakness of vision with a huskiness of voice, after pharyngeal diphtheritis, ought to be able to verify in the larynx in the presence of a paralysis of the vocal cords an associated paralysis of the accommodation.

Thus, I recently saw:

Miss A. recovered rapidly from diphtheritis, but soon developed loss of voice, together with loss of vision for near objects, so that to all intents and purposes she was speechless, and without useful vision. The diagnosis was made of simultaneous paralysis of accommodation and of one or both vocal cords. The examination with the laryngoscope revealed a characteristic paralysis of the left vocal cord. All of these conditions disappeared after the use of strychnine hypodermatically.

It is beautiful to see within the eye the patches pathognomonic of Bright's disease, or to observe through the translucent drumhead the accumulation of serum within the tympanum. But to me a sight still more beautiful is the pulsating vibrations of the vocal cords, when fully illuminated. Every physician ought to be able to catch this image momentarily, even if from the extreme rarity of cases he may never see a tumor of the larynx or be asked concerning the propriety of its removal. Many as are the rules laid down for the accomplishment of this illumination, my experience tells me that it is largely a matter of light, and of tact in the management of the mirror.

Even after the larynx appears sufficiently illuminated, but when we as yet can see nothing but a reddish tube, it requires a twist of the fingers, a turn of the mirror this way or that, to enable us to bring out in its full beauty the pallor of the vibrating cords.

There was a time, not long ago, when every ophthalmic surgeon was an ophthalmic surgeon and nothing more, and when the aurist treated the ear and nothing else. Nowadays the eye and the ear are being more and more treated together by the same surgeon, who is called both oculist and aurist. The reason given for this union of the two specialties is the extreme importance of the especial senses

of sight and hearing. Now I would go further still and urge that the eye and the ear, the nose and the throat, ought all to be treated by the same specialist, on the ground of the connection of all of these organs to a greater or less extent, through the anatomical connection of the adjoining cavities of the head. When this is brought about, we shall, for example, cease to see patients urgently in need of local treatment to the muco'us membrane of the middle ear to prevent deafness, being treated for their throats alone, and all the time consoled with the assurance that with the disappearance of the throat symptoms the hearing will return, which it fails to do, having been too much injured by the long delay. It is as plain a duty for the throat specialist to send such cases to one who understands the ear, as it is for the oculist to transfer at once to the practitioner for skilful help, the patient presenting himself with the patches and the retinal hemorrhages indicative of Bright's disease. Hence in the union of all these specialties the profession of medicine would be advanced.

The larynx being an important organ of speech, and so many people making a livelihood by singing and elocution, it is imperative that much attention should be given thereto. But the difficulties of examination and of manipulation are so great, that there always will be and ought to be specialists to attend to the same. These, too, could follow out the tumors and rare cases about the nose and naso-pharynx, and so act as consultants. Nevertheless, no one but the most skilful should be permitted to touch the larynx, lest the ignorant application of a caustic, or the unskilful tearing of a tumor from the cords or cartilages should excite spasm of the glottis or oedema of the larynx, and the patient's life be endangered.

THREE CASES OF EPITHELIOMA OF THE AURICLE.

By DR. J. A. SPALDING, PORTLAND, ME.

EPITHELIOMA of the auricle is somewhat of a rarity, and as I have lately seen three cases, but found hardly any mention of the subject in either the text-books or magazines, I venture to report those of my own observation in brief.

The FIRST PATIENT was a man of forty-one who had always been healthy, and had no family history of cancer, unless a brother with a "tumor," belonged to this diathesis.

The patient first observed in January, 1890, a small scar on the helix, but so far back that he could not see it unless by bending the entire auricle forward and looking at the reflection in a looking-glass. As the scab was slightly irritating, he fell into the habit of scratching it, and making it bleed, whereupon the irritation would generally cease. In the course of the following summer and fall, the scab extended farther along the edge of the helix and auricle till it measured about 1 cm in length, and seemed to sink deeper into the tissues, since the whole structure felt harder than normal. The irritation at times increased to severe pain, robbing the patient of his sleep.

The operation was performed by the surgeon in charge at the Maine General Hospital in November, 1891, with an ordinary scalpel, and consisted in removing a V-shaped piece of the auricle, embracing all the tissue involved, and also some apparently healthy. The margins were then sutured and the recovery was good, though owing, as I think, to the presence of the stitches, there was much swelling of the parts for the first two or three days.

The portion excised was examined under the microscope, and discovered to be a genuine epitheliomatous mass with signs of malignancy.

The patient was discharged in ten days, apparently well, but in February 1892, he re-appeared with the tumor larger than before, and constantly painful.

At the second operation, the diseased tissue was removed even more abundantly than before, so that the auricle was reduced to a misshapen stump. This time too the margins were sutured instead of being strapped together as in my opinion they should have been.

The patient was dismissed in a few days, the field of the operation looking perfectly healthy, but the auricle hardly recognizable in form owing to the operations to which it has been subjected.

The SECOND CASE was that of a man with no family history who had suffered for three years with a ragged sore behind the helix of the right auricle, and extending along the furrow where the auricle is attached to the skull, and burrowing beneath the healthy tissues.

The bleeding surface was about $1\frac{1}{2}$ cm in length, upon the rear of the auricle, and extended deeply into the external meatus, and also across the insertion of the auricle over upon the mastoid process. The mass on the auricle was carefully abscised without cutting too deeply into the cartilage, and that portion of the epithelioma in the fissure behind the auricle, as well as that extending over upon the mastoid was scraped away as abundantly as possible. The really epitheliomatous tissue did not appear to extend deeply into the meatus, as at first appeared. Recovery took place by granulation in the cavity, and by first intention upon the auricle, and an apparently good recovery had been made at the time of the patient's discharge. The microscopic examination left no doubt of the true epitheliomatous nature of the foreign mass.

Three months later, there was no relapse.

The THIRD CASE was that of a man of sixty, who for the previous five years had perceived in the rear of the left auricle, by the sense of touch, a hard nodule without irritation, pain, or hemorrhage. Lately it had been broken open on the surface, begun to be painful, and to bleed easily if touched in the slightest degree. The nodule was situated about on a level with the external meatus, on the rear of the auricle, and immovably attached to the same. The operation consisted in abscission with the knife, the incision ex-

tending deeply into the cartilage of the auricle, but an effort was made to dissect off the morbid tissue without removing any more of the cartilage than was absolutely necessary. The result was apparently good, in that after four months there had been no relapse. The microscopic examination of the tissue removed, showed the characteristic cells of epithelioma.

The aim of the surgeon in these cases should be to remove as little of the cartilaginous tissue as possible, in order to avoid a noticeable deformity in the auricle. Personally I should use the sharp spoon and scrape away all the morbid tissue wherever feasible. If this cannot be properly done so as to ensure the patient reasonably from a relapse, then the knife may be employed.

Would it not be better to use the sharp spoon in every case of auricular epithelioma, to dig and scrape away all the tissue affected, and then to cover the resulting cavity with a skin graft from some healthy portion of the body?

My experience is rather in favor of strapping the margins together in these cases, than to use sutures. If the latter seem indispensable, they ought to be as close together and as fine as they can be made. I well remember a very renowned aurist saying some years since, that he would never use a suture in operations of any sort on the auricle, or in cases of injury of that organ; that the parts could always be better adjusted by straps than by sutures of any sort, that the disfigurement was less, and that there was less danger of sloughing and erysipelas from strapping than from the use of sutures. I also recall a conversation with the late James Hinton, in which he expressed a preference for the use of straps. Politzer so far as I can discover does not say anything against the use of sutures. He advises an interrupted suture in incised wounds of the auricle, so that it would seem that he could not possibly object to the use of a similar suture after a simple incision for the removal of an epithelioma from the same structure.

It is a question with me, whether the abundance of the sutures in the first case may not have been the direct cause of the extreme swelling of the tissues and of the rapid re-appearance of the tumor in the same locality.

Whether epithelioma of the auricle is more prone to relapse than that in other regions of the body is still open to discussion. It would, however, seem at first glance as if the easy accessibility of this organ, and the great facility that it offers to the irritation of microbe-infested finger nails, would account for the apparent frequency of the relapse in precisely the same region upon the auricle and even after the most thorough removal of the tissues involved, when compared with the rarity of its reappearance in precisely the same region in the less accessible portions of the trunk or limbs.

In conclusion, so far as my personal experience is concerned, the greater frequency of epithelioma of the auricle in the male sex is worth observing. I do not remember how many cases in all I have seen of this morbid growth upon the auricle, but I have never yet seen a single case in a member of the female sex, young or old. Possibly if this is the experience of other aurists, there is a compensation of averages of epithelioma in the greater frequency with which the female sex is thus affected in other portions of the trunk, or in the internal organs.

CONDYLOMATA OF THE AUDITORY CANAL.¹

By H. V. WÜRDEMANN, M.D., MILWAUKEE.

SPECIFIC lesions of the auditory apparatus may occur without concomitant symptoms in other structures. The systemic origin of the malady may thus be overlooked and the patients are treated for a presumable local affection without benefit. We occasionally meet with strumous subjects whose otorrhœa does not yield to local applications or operative treatment, in whom specific medication yields good results. The most frequent part of the organ of hearing to be attacked by the ravages of syphilis is the inner ear.

Among the external manifestations gummatæ are most common while condylomata are seen less often.² Some authors claim that the external auditory canal is not rarely the seat of broad condylomata.³ However, statistics do not support this statement. Deprès⁴ examined twelve hundred syphilitics of whom nine hundred and eighty had condylomata but found only six such lesions in the external ear. Stöhr⁵ found them most generally in the middle portion of the canal and generally only in one ear. When at the meatus they are usually single but when deeper may be multiple.⁶ Otorrhœa usually precedes the lesion,⁷ the latter arising probably from the irritating nature of the discharge. Sometimes it appears in the form of a red and painful, ill-defined swelling, followed by the formation of painless granulation tissue which breaks down and discharges and is succeeded by ulceration of indefinite duration.⁸ These

¹ Read at a meeting of the Wis. State Med. Soc. in Milwaukee, May 6, 1892.

granulations appear much the same as in cases where there is no syphilis, being sometimes so large as to fill the canal.¹ The diagnosis is of course established by the history and concomitant symptoms.

Some months ago an interesting case of condylomata affecting the auditory canal came under my observation. The diagnosis was not apparent to me until after some weeks of treatment. The history was briefly as follows:

A lumberman came with suppurative inflammation of both middle ears which he claimed to have existed for three months and to have originated after a blow upon the head. Believing it to be an ordinary case of purulent tympanic disease no specific history was sought at this time. *Status præsens* :—Both ears discharge a foul smelling matter, the membrana flaccida on both sides being gone. On the inferior and posterior walls of the right canal, extending from the meatus to the remains of the drumhead, occupying a quarter of the caliber of the canal, is a granular raised ulcer, covered with discharge, which when cleansed appears reddish-gray and bleeds upon touch. H. D., R. and L.: loud voice at 2 m. Bone conduction good on both sides.

The patient has had *ozœna* for five or more years and there is a perforation of the septum with ulceration of its bony portion. He has a ferocious-looking moustache but the upper lip is devoid of hair for the space of two finger-breadths immediately under the nose, this place being the seat of an elevated excoriated patch. The middle-ear disease was readily relieved by antiseptic treatment but the ulcer of the canal seemed even worse after six weeks of cleansing and topical applications. The sore on the upper lip was likewise treated daily by ointments, etc., without benefit.

In sheer desperation I made a careful general examination of the case and after close questioning the man admitted having had a chancre of the penis followed by a clearly defined eruption and sore throat some fifteen years before. A diagnosis of syphilis had then been made and the patient treated for some months until the symptoms had disappeared. Since that time he had occasional attacks of sore-throat, rheumatism and skin trouble to which he had paid no special attention. I sent the man to Dr. D. J. Hayes in consultation who declared him to be suffering from late secondary symptoms and thought that the lip affection was a condyloma. The patient was put upon intra-muscular injections of corrosive

sublimate and iodides internally. The ulcers in the auditory canal and on the upper lip improved after the fifth or sixth injection and rapidly healed by the formation of cicatricial tissue. He was then supplied with ordinary "mixed" treatment and sent home: ears dry; no restoration of the drum membrane; H. D., R. and L. was watch on pressure, voice at 6 m; markedly improved in general health.

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HEAD INJURIES WITH AURAL COMPLICATIONS.

By J. E. SHEPPARD, M.D.,

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CASE 1.—Wm. B., æt. forty-seven, laborer, b. in Germany, came Nov. 6, 1889, to the aural clinic of the Brooklyn Throat Hospital, giving the following history: On Sept. 1st he fell two and a half stories down an elevator shaft, striking on his head. Patient says, he was five days unconscious; on regaining consciousness, had a violent roaring in his head. When he first got on his feet, he was very dizzy, feeling all the time as if pitching forward and to the left. This still continues; has had no headache since the fall; has never vomited. Within the past ten days (previous to that, he had, since the injury, been only moderately hard of hearing) his hearing rapidly failed, first in the right ear, three or four days elapsing between commencing and entire loss of hearing. Hearing in the left ear began to fail before that of the right was entirely gone, and at the same time he noticed a slight discharge from the left ear, unattended with pain.

From St. Catherine's Hospital, to which he was removed at the time of the accident, I obtained the following brief record: "Admitted Sept. 1, 1889, with a contused wound over the right eye. For two days he did not cerebrate normally. He then developed delirium tremens, followed by an attack of meningitis. During his stay in the hospital, he was hard of hearing, and complained of 'roaring in his head.' Ears not examined. No discharge noticed from either ear. Was not well when discharged."

Present Condition: Watch not heard in either ear. In right ear tuning-fork not heard by air-, and but slightly, if at all, by bone-conduction. In left ear, air-conduction better than bone-. Loud conversational tones heard 6" in left ear, not at all in right.

Right ear: External canal and *Mt* about normal in appearance. Left ear: In outer part of cartilaginous canal is a small furuncle, already discharging. *Mt* has a small dry perforation in posterior inferior quadrant. Inflation improves the hearing slightly in the left, not at all in the right ear.

Treatment: Ordered pilocarpin muriat. gr. $\frac{1}{8}$, to be taken by the mouth three times daily. Left canal to be syringed three times daily with weak carbolic solution.

Nov. 7th.—Patient came to-day sweating profusely, profuse salivation, complains of general cold feeling. On questioning him, I found more than a grain of the pilocarpin had by mistake been taken in the twenty-four hours. Stopped the medicine.

Nov. 8th.—Hearing distance, right ear, watch $\frac{9}{10}$. Tuning-fork slightly by air-, better but poorly by bone-conduction. Left ear, watch $\frac{9}{10}$. Air-conduction better than bone-. Patient says the dizziness is markedly better than yesterday.

He now entered the wards of the Long Island College Hospital, and passed from my observation, with the exception of one visit I made to him by courtesy of and in company with Dr. Arthur Mathewson, Consulting Aurist to the hospital. Dr. M. considered that the symptoms indicated labyrinthine concussion, rather than a fracture at the base of the skull. About three months later I saw the patient once at the Brooklyn Eye and Ear Hospital. The dizziness had gradually diminished, so as to be no longer troublesome. The deafness and tinnitus were unchanged.

It is very unfortunate from a diagnostic standpoint that no careful examination of the ears was made at the time of the injury. In favor of concussion of the labyrinth are, the absence of discharge, either bloody or serous, and the rapid loss of hearing two months later, shown by the tuning-fork to be of labyrinthine origin. In favor of fracture of the temporal bone are, "the attack of delirium tremens followed by meningitis," the perforation of the membrane visible when I first saw him, and the great dizziness, which made the patient feel all the time as if falling to the left, and which persisted at least three months.

CASE 2.—Michael H., æt. thirteen, schoolboy, came Dec. 30, 1891, to the clinic of Dr. Hickok, at the New York Eye and Ear Infirmary, with whom I was at that time working, and through

whose kindness I am permitted to report the case. His mother related the following history: Some time during the previous summer he fell a considerable height from a bridge; following this he was several hours unconscious. There was a moderate hemorrhage from the left ear, and from the nose and mouth. There was no facial paralysis, and no marked dizziness.

Present Condition: Hearing distance, in right ear, normal. In left ear, conversational tones, 3-4 feet. Left canal was filled with pus. It was seen after cleansing that there was something in the bony canal about $\frac{1}{2}$ " outside the *Mt.* At the second visit, with thorough cleansing in the meantime, it became clear that this body was whitish in color, that it extended horizontally entirely across the canal, and that it was firmly fixed both in front and behind. With the probe it felt hard, and bone-like, and could not be displaced. The lumen of the canal was entirely filled except a small space below and behind, and another, less than pin-head-sized, space above and in front. On hasty examination these might have been mistaken for perforations in the membrane, so much did they resemble them. In three weeks, with thorough cleansing, suppuration had entirely ceased. When last seen, Feb. 6th, this body appeared to be moving slowly outward. Through the two open spaces could be seen what looked like normal membrana tympani beyond. There was no pain. Hearing had improved to more than six feet for conversational tones.

The diagnosis made by Dr. Hickok was "fracture of the temporal bone, with splintering," and he believed this body in the external canal was a splinter of bone working its way outward. As the body by its presence caused no untoward symptoms, while efforts at extraction were attended with severe pain, it seemed better to leave it alone and watch its progress outward.

CASE 3.—John F., aet. eighteen, carpenter, born in England, came to my clinic, at the Brooklyn Eye and Ear Hospital, Feb. 4, 1892, with the following history: Right ear has been deaf since childhood, supposed to be the result of scarlatina. Up to three years ago, the left ear was, so far as patient knows, normal. He was then struck on the left side of head, above the ear, with a piece of iron. He became immediately unconscious. Following this, which lasted several hours, was a mildly delirious condition, an interval of thirty-six hours elapsing before complete return to consciousness. Directly after the injury, the father says, there was, for a short time, a flow of blood from the left ear and

nose and, he thinks, also from the mouth. During the first few hours following the injury there were "to-and-fro movements of the eyes," nystagmus. Immediately on regaining consciousness patient found he was very hard of hearing. For a week or two there was great dizziness, which gradually disappeared. Two or three days after the injury there was noticed a slight purulent discharge from the left ear, which, however, lasted only a few days. There is occasional tinnitus. He has been under the care of able specialists, without improvement.

Present Condition: Hearing distance, right ear—only an occasional word if shouted directly into the ear. Tuning-fork heard only slightly by air, a little better, but very poorly, by bone-conduction. Left ear—0 for watch and whisper, 3" for loud spoken words. Tuning-fork heard much louder, and 24" longer by bone-conduction than through the air. Tuning-fork on the vertex is heard altogether in the left ear. Right external canal and *Mt* almost normal in appearance. In the left external canal, a large piece of inspissated cerumen. After its removal the *Mt* was seen to have a large dry perforation, the posterior superior and part of the posterior inferior quadrants remaining. The handle of the hammer, to which was attached the remnant of the membrane, ran backward and inward, and was adherent to the promontory. Both Eustachian tubes open freely, but without improvement.

Treatment recommended, was excision of the ossicles of left ear, which, being consented to, was done February 10th, in ether narcosis, after which the canal was lightly filled with iodoform gauze.

Feb. 11th.—Hears conversational tones 6".

Feb. 14th.—Has had for the past two days pain referred to the Eustachian tube. Hearing not so good.

Feb. 19th.—Pain has ceased. There is a slight purulent discharge. Conversational tones heard 3"-4".

March 1st.—Discharge has nearly ceased. Conversational tones heard 6"-8".

CASE 4.—Dennis D., æt. twenty-four, laborer, born in the United States, was first seen February 5, 1892, having been referred to my clinic at the Brooklyn Eye and Ear Hospital by Dr. Barber. The following history was elicited: On Nov. 2, 1891, was struck on left side of head and left shoulder with a heavy coil of pipe. While unconscious he was removed to Chambers Street Hospital, New York, and two days later he was taken to the Brooklyn

Hospital, where he was treated for "a dislocated shoulder, and a fracture at the base of the skull." He was not long unconscious. After regaining consciousness, he felt blood escaping from the left ear, the nose, and the mouth; felt also that the left side of his face was paralyzed. The facial paralysis continues, but has steadily improved since the injury. Ever since the injury he has been very dizzy, having still to watch his steps most carefully to keep from falling.

Present Condition: Hearing distance, right ear, normal; left ear, watch, $\frac{1}{6}$; whisper, 2"; conversational tones, 3'. Bone-conduction better than air. Weber's test, turning-fork heard in left ear.

Right ear: External canal normal. *Mt* very opaque, considerably retracted. No light reflex in the normal position; a small point of light above the short process.

Left ear: Deep in the external canal is a mass of *débris*, consisting of dried blood, epithelial scales, etc. Walls of bony canal very red. Along the anterior superior wall about a quarter inch outside of the membrane is a small piece of dried blood still adherent. *Mt* very opaque, no light reflex, hammer vessels injected. No perforation or cicatrix visible. Eustachian tubes open readily, increasing the hearing in left ear to 4" for whisper. No paralysis of the palate muscles.

Treatment: Patient was already taking from Dr. Barber a mixture containing iodide of potassium and fl. ext. ergot. This was continued. The *débris* was removed from the external canal with probe and curette. Inflation. Blister behind and below the auricle.

Feb. 12th.—Hammer vessels much less injected; hears whisper 8".

Feb. 23d.—After inflation, whisper heard two feet.

March 4th.—Hears whisper twelve feet. Dizziness and facial paralysis are slowly improving.

These three histories I have recorded together as presenting a group of cases seen in rapid succession, and having several symptoms in common. In each case there was a considerable period of unconsciousness, together with hemorrhage from the ear, nose, and mouth. In each, the sound-perceiving apparatus seems to have escaped injury.

On the other hand, there were individual differences: In

Case 2, the *Mt* has not yet been seen, but from the history of suppuration it is, I think, fair to assume a rupture of the *Mt*, followed by middle-ear suppuration. There was splintering of the bone, with a fragment making its way outward, and in a measure obstructing the canal. In Case 3, there was undoubtedly rupture of the *Mt*, followed by a short period of suppuration, with considerable loss of substance, and the handle of the hammer was left adherent to the promontory. In Case 4, in addition to the facial paralysis, there was probably a rupture in the region of Shrapnell's membrane, which quickly healed; ground for this belief being furnished by the presence of dried blood still adhering to the canal wall, and only in this region. Why, in three months, this should not, in accordance with the well-known rate of growth outward of the skin lining the external canal, have been more than a quarter inch away from the membrane, is not clear to me, unless the paralysis of the facial nerve had interfered with the normal nutrition of the parts.

I believe that in all three cases there has been a fracture of the temporal bone. In looking over the literature of the subject among the German and American writers, in works upon the ear, as well as upon general surgery, the most clean-cut exposition of the subject is that given by Dr. Buck (*Manual of Diseases of the Ear*, p. 291, and *International Encyclopædia*, vol. v., p. 348). The following quotation is from the *Manual* "Fractures of the temporal bone may be subdivided into two classes: 1. Fracture or diastasis of the tympanic or squamous portion, in the region of the middle ear, without implication of the pars petrosa. 2. Fracture of both the tympanic and the petrous portions. Both are produced by *contre-coup*. In the first variety, the line or lines of fracture correspond with the lines of union of the three bony portions which together form the temporal bone, and which in foetal life represent separate centres of growth, viz.: the squamous portion, the tympanic portion, and the petrous portion. These fractures, therefore, partake somewhat of the nature of diastases. In the second variety, the fracture of the petrous portion of

the temporal bone represents a genuine fracture. . . . In cases of fracture of the temporal bone, a hemorrhage from the ear means, as a rule, a rupture of the blood-vessels in the vicinity of Shrapnell's membrane. Such a hemorrhage may be copious, and may continue for a comparatively long time; and the mere fact of its copiousness does not indicate that a communication has been opened between the cavity of the tympanum and any of the large vascular channels which surround the temporal bone. . . . I am also satisfied, from examinations which I have made in cases of injury to the head of recent occurrence, that fractures of the temporal bone often occur without the slightest bleeding from the external auditory canal." Upon this point Dr. Buck differs from most writers on this subject, who, in speaking of hemorrhage from the ear as a diagnostic sign of fractured base, say that, to be of any value as a means of diagnosis, it must be of a serious nature, and, above all, it must continue for some time.

Buck (*loc. cit.*, page 294), says: "If we consider for a moment the solid, masonry-like construction of the temporal bone, we can scarcely resist the conclusion that, when a blow upon the top, back, or opposite side of the head is followed by any decided symptom whatever in the ear (as, for instance, bleeding, a watery discharge, or even simply pain), a fracture or a diastasis must have taken place in the corresponding temporal bone. A mere jar of the head is not competent to produce a hemorrhage from the external auditory canal. On the other hand, an actual stretching of the soft parts to such a degree as to tear one or more blood-vessels, is not, under such circumstances, physically possible in the vicinity of the drum-membrane unless at the same time there shall have been an actual giving way of some part of the surrounding arch of bone."

Hemorrhage from the nose and mouth, in cases similar to the above, seems to be very little spoken of. Nancrede, in his article on "Injuries of the Head" (*Intern. Encycl. of Surgery*, vol. v., p. 34), says: "Epistaxis can only be of any diagnostic value when persistent, and when accompanying symptoms of grave cerebral concussion. . . . Pharyngeal

hemorrhage, or vomiting of blood, is of much less value than either orbital or aural hemorrhage. . . . Bleeding from the pharynx, or vomiting of blood, may proceed, not from fracture of the vault of the pharynx, or roof of the nose, but from a fracture of the petrous bone without rupture of the membrana tympani, so that blood entering the tympanic cavity escapes into the pharynx by the Eustachian tube. . . . Indeed this sometimes may occur even with a ruptured membrana tympani. The possibility of this double hemorrhage arising from a fracture of the petrous bone alone, and not from one of the bones forming the roof of the nose or naso-pharynx, must not be forgotten in making the diagnosis, lest greater cranial injury be supposed to exist than in reality has occurred." In each of the three cases reported above there was bleeding from the nose and mouth. Of the origin of this I do not feel sure. That there was a fracture anywhere except in the immediate vicinity of the tympanic cavity I do not believe. Hence, and because the hemorrhage was slight, I am inclined to the opinion that some of the blood from the tympanic cavity found its way through the Eustachian tube, and thence outward through the nose and mouth.

As an aid in locating a fracture of the temporal bone, where there is facial paralysis, Nancrede (*loc. cit.*) says: "Owing to the connection of the facial with the sphenopalatine ganglion, it depends on the part of the *portio dura* injured, whether the uvula and soft palate will be paralyzed as well as the facial muscles, or not. In the former event, the line of fracture must be across the internal auditory meatus, so as to injure or compress the nerve before it gives off the greater petrosal nerve—that is, between the brain and geniculate ganglion, which is situated in the first part of the aquæductus Fallopii. If the uvula and palate be unaffected, the line of fracture must traverse the petrous bone so as to injure the facial nerve as it passes in the Fallopian canal across the internal wall of the tympanum." This aids in locating the fracture in Case 4, since there was no paralysis of the uvula or soft palate. It was in this case also in which the dizziness was by far the most severe and most

prolonged. From the proximity of the Fallopian canal, as it crosses the inner wall of the tympanic cavity, to the semi-circular canals, I think it may safely be held that one or more of the latter were involved, and hence resulted the great and long-continued dizziness.

Treatment : An interesting point relative to the use of pilocarpin was accidentally raised in Case 1. Owing to circumstances, the drug was necessarily ordered to be taken by the mouth, instead of being given hypodermically in $\frac{1}{4}$ grain doses t. i. d. By mistake the patient took in the first twenty-four hours a grain of pilocarpin muriat., and showed the full constitutional effect of the drug. A day later than this was noted the only positive gain in hearing noticed while he was under treatment. Whether it was a case of *propter hoc* or only *post hoc*, I am not prepared to say.

In Case 3, the following considerations led me to at once recommend the removal of the ossicles to improve the hearing. First of all, the patient had lost the hearing in this, the only ear that had ever been useful to him; the tuning-fork showed the presence of a good internal ear; the more ordinary methods of treatment had been tried with little or no benefit; my previous experience had led me not to expect any great permanent benefit from simply severing the adhesions of the malleus to the promontory. The day following the operation the hearing had improved from 3" for loudly spoken words to 6" for conversational tones. He then lost part of this gain from subsequent inflammatory swelling, but is now improving again, his hearing being on March 1st 6"-8" for conversational tones. Patient is still under treatment, and I anticipate still further gain in hearing.¹

In Case 4, the treatment consisted of inflation and counter-irritation, and the hearing distance has steadily increased from 2" for a whisper, up to the present time (March 4th) when it is 12 feet.

In conclusion it seems to me :

¹ NOTE.—July 1st. This anticipation has not been realized, the hearing having remained at 6"-8" for conversational tones.

I. That the division made by Dr. Buck of fractures of the temporal bone into 1. "Fracture or disastasis of the tympanic or squamous portion, in the region of the middle ear, without implication of the pars petrosa. 2. Fracture of both the tympanic and the petrous portions," is an entirely tenable, and eminently practical, one.

II. That fractures of the temporal bone, without fatal consequences, and even without loss of hearing, occur more frequently than is generally believed.

III. That in all cases of suspected fracture of this part of the skull, a thorough examination (by speculum and reflected light) should be made of the external auditory canal, of the membrana tympani, and, so far as possible, of the tympanic cavity, as an aid to diagnosis and prognosis, and to obtain any indications that may exist for treatment.

NOTE ON THE OPERATION FOR RE-FORMING THE AUDITORY MEATUS.

By H. GIFFORD, M.D., OMAHA, NEB.

ONE so seldom has the opportunity of operating for the restoration of the auditory meatus that I think it worth while to describe a method, new, as far as I know, after having tried it but once.

In 1891, I treated a patient with lupus of the left auricle and the adjacent tissues, whose full history I hope to give at some future time, when the case shall have reached a definite termination. The auditory canal was so filled up by cicatricial tissue that the patient, for months before coming to me, had maintained an opening for the exit of the slight purulent discharge from the middle ear only by keeping a small quill constantly pressed down into what was left of the meatus. Under chloroform, the cicatricial tissue and granulations which filled the meatus down to the remnants of the drumhead were cut out, together with a large tuberculous nodule extending deep into the tissues at the junction of the pinna with the cheek above. The canal was then thoroughly scraped with a sharp spoon, and after having been cleaned with peroxide of hydrogen it was plastered throughout with thin Thiersch flaps taken from the forearm. Aristol was then filled in around a small glass tube which reached nearly to the middle ear, and a moist dressing was applied and left for two days, after which it was changed daily for a week. The flaps healed in perfectly, and for several weeks the man had a well formed meatus lined with healthy epithelium, and there is no rea-

son to suppose that this would have undergone any change if the operation had been done for any less malignant affection.

Unfortunately, however, the disease was not eradicated. An injection of tuberculin led to the discovery of a tuberculous deposit in the mastoid cells, the eradication of which demanded the destruction of the greater part of the recently formed meatus. Nevertheless, the excellence of the result, so long as it was allowed to last, and the confidence which an extensive use of Thiersch flaps in other operations has given me, in the stability of the results obtained by them, encourage me to recommend their use to any who may be called upon to re-form or newly form an auditory meatus.

I ought to state that in my case the application of the flaps was especially easy on account of a large part of the centre of the pinna having been destroyed, and this suggests the idea that in performing the operation on an ear with a normal pinna, it might be advisable to partially detach the latter if, otherwise, it were found difficult to adjust the flaps accurately.

TWO CASES OF BEZOLD'S PERFORATION OF THE MASTOID ANTRUM.

BY PROF. GUYE, AMSTERDAM.

Translated by Dr. WARD A. HOLDEN.

BEZOLD, now professor of otology in Munich, described, in the year 1881, a new manner of extension of purulent inflammation from the tympanic and neighboring cavities.¹

This consists in an abscess deep in the mastoid process, perforating on the medial side. The pus does not reach the surface, being prevented by the various muscular attachments on the outer surface and tip of the mastoid process.

Following the perforation there is swelling of the retro-maxillary fossa, which is easily mistaken for a simple swelling of the soft parts, lymphatic glands, etc., and later pus burrows in various directions between the deep fasciæ of the neck, often passing backward forming retro-pharyngeal abscesses—rapid processes which if not rightly understood and treated, will lead in all probability to a lethal ending.

Bezold produced this peculiar process artificially in the dead subject, by opening the mastoid process externally, then perforating the medial wall with a gouge and injecting thick colored solutions which spread in the same manner as the pus. He suggested the same process as an operative procedure, which in one case at least was successful.

These cases, judging from the reports in otological literature in the ten years since Bezold published his paper, are not frequent. I have found only the following reports.

¹ *Deutsche med. Wochenschr.*, No. 28, 1881.

Moos,¹ in a paper before the association of South German aurists in Freiburg, at Easter, 1889, described four cases that he had observed, three of which resulted fatally and one favorably.

Kiesselbach at the meeting of the same association May 25, 1890,² presented a patient in whom a Bezold process had been complicated with a retro-pharyngeal abscess, and the local affection was gradually cured, but an apex catarrh and tuberculosis of the lungs had developed.

Gorham Bacon,³ among a number of cases of abscess of the antrum, described one of Bezold's disease which resulted favorably.

Politzer in his text-book⁴ alludes to Bezold's observations and says that both Burckhardt-Merian and he had each treated one such case.

Hartmann, in the fourth edition of his text-book, 1889 (p. 202), states that he has opened the antrum thirty times in acute inflammation of the middle ear, and of these four showed a perforation of the medial wall of the mastoid process. Two of these cases were described in detail by Dr. Cholewa,⁵ his assistant at that time.

Hartmann has seen several cases since, and does not consider them so rare as the few reports in literature would lead one to believe.

Kirchner mentions such cases in the third edition of his text-book (p. 152, 1890). In a case that he observed, the pus spread along the fascia of the digastric muscle and formed a hard tumor under the chin.

As the case histories are not numerous, I shall give two in full.

CASE 1.—Abscess in the mastoid antrum, with perforation through the medial wall of the process, and also into the external canal, with facial paralysis; cured.

Oct. 17, 1887.—I saw for the first time Mr. B., aet. fifty, in

¹ *Zeitschr. f. Ohrenheilk.*, p. 47, 1890.

² *Zeitschr. f. Ohrenheilk.*, p. 114, 1891.

³ *ARCH. OF OTOL.*, xviii., p. 301, Case 16; *Zeitschr. f. Ohrenheilk.*, xxii., p. 63, 1891.

⁴ Pp. 634 and 650.

⁵ *Deutsche med. Wochensch.*, No. 49, 1888.

consultation with Dr. Groeneboom. The patient, previously healthy, had pain in the ear eleven weeks before, and soon after otorrhœa with tenderness of the mastoid process. A Wilde's incision was made twice, no pus being found, but a temporary improvement following each incision. Gradually there developed in the neck and the retro-maxillary fossa a hard tender swelling, which showed no fluctuation, and which was regarded as being due to the swelling of a lymphatic gland and oedematous infiltration. There was violent pain in the ear, which allowed the patient no rest day or night, and since the previous day there is complete facial paralysis. I found perforation of the *membrana tympani*, granulations in the external canal, chronic nasopharyngeal catarrh. Politzerization gave no result, with the catheter a perforation sound. I washed out the tympanic cavity through the catheter and treated the patient in the ordinary manner.

Nov. 8th.—Three weeks later I saw the patient again. He was at first somewhat improved, but the condition was then less favorable. I found at that time a round polypoid granulation, proceeding from a fistula in the posterior wall of the canal. I cut off the granulation with a ring-shaped knife, and saw that pus exuded from the fistula, more abundantly when the hard swelling below the mastoid was pressed upon. This condition was inexplicable to me at the time, and only on seeing the case again was I reminded of Bezold's case, and I saw that there had been a double spontaneous perforation of the antrum; one passing into the external canal, and one through the medial wall of the process, and that by pressure on the abscess the pus was forced back into the antrum through one opening, escaping then from the other. I wrote my opinion to the attending surgeons, and stated that I thought that with the employment of moist heat, a point would show in a few days where the opening was to be made. Dr. Groeneboom confirmed my opinion, and eleven days later I found a fluctuating spot at the anterior margin of the sterno-cleido-mastoid muscle, and from an opening made here a quantity of pus escaped. I passed into the opening a rubber tube without lateral perforations, and water injected into this came freely from the ear. This tube was left in as a drainage-tube, and the injections were repeated daily, while the ordinary treatment, Politzerization, etc., was continued. I did not see the patient again before his recovery. After two weeks of this treat-

ment, there was a complete *restitutio ad integrum*. Six months later I saw the patient, who was entirely cured.

CASE 2.—Chronic Ozæna. Otorrhœa of Short Duration. Spontaneous Perforation through the Medial Surface of the Mastoid Process. Obstinate Headache. Chiselling of the Antrum. Retro-pharyngeal Abscess. Operation. Cure.

Mr. H., æt. sixty-five, came under my care in January, 1891. He had had for five or six years a chronic nasal catarrh with hypertrophy of the mucous membrane, formation of crusts, fetor, and anosmia, which had been treated with injections, when suddenly he had a tingling in the left ear without pain, and on the following day an otorrhœa. The otorrhœa ceased after some days' treatment, but tenderness of the mastoid and the left half of the head continued. In October of the same year a mastoid operation was proposed, but the patient would not consent, and put himself under the care of an ignorant *masseur* who promised him a cure without operation, massaged him four months with the result that the headache grew steadily worse, and a hard swelling gradually developed at the lower border of the cranium. I saw the patient January 27th. At that time there was no otorrhœa, the posterior wall of the canal was bulging, the mastoid not sensitive, but a severe headache over the entire left half of the head with nightly exacerbations, a hard sensitive swelling along the lower margin of the skull, and chronic naso-pharyngeal catarrh with crusts and fetor. The patient refused an operation.

The hearing was : L = 0, R, good. The nose, pharynx, and ear were treated in the usual manner. As this caused no marked improvement an operation was decided upon, although there was no absolute certainty of the presence of pus in the antrum.

Feb. 7th.—The antrum was opened with a chisel. After passing through a dense layer of bone the antrum was reached and pus evacuated. The cavity of the antrum was large, and a drainage-tube was left in the wound. Two weeks later there was more swelling below and behind the mastoid and the fluctuating tumor spread to the back of the neck. When this tumor was pressed upon pus exuded from the fistula in a stream. There was, however, nowhere a superficial fluctuation which would serve as an indication for an incision.

March 10th.—On the advice of a colleague who thought that there was pus beneath the periosteum, I made a long deep incision

through the periosteum from the fistula downward and backward to the margin of the process. There was no pus beneath the periosteum.

March 15th.—The tumor had almost disappeared, and pressure at the lower margin of the cranium forced no pus out of the fistula. From this we concluded that the pus had been gradually absorbed and that the abscess cavity would close, when four days later we were disabused of this idea in a most unpleasant manner.

March 16th.—Some pus exuded on pressure, on the 17th none, on the 18th a little, on the 19th none, but the patient complained of difficulty in swallowing. When the pharynx was examined, a large retro-pharyngeal abscess was found, which occupied the entire left half of the pharynx and clearly showed fluctuation. This abscess was opened with a knife, and a quantity of pus evacuated. Each day it was reopened and washed out. Four days later there was again a marked swelling deeper in the pharynx and the patient could not swallow. Two new abscesses were opened with the knife, and all were kept empty by pressure with the finger.

At first, massage of the neck forced some pus into the throat, but this soon ceased, and the infiltration of the pharynx disappeared, and the general condition improved.

May 6th.—The patient came to my office. There was no headache.

May 20th.—The tube was removed and the wound soon healed. The giddiness gradually passed off. There remained only some sensitiveness of the deep cicatrix over the antrum, which would disappear at each catheterization and return on the following day. For this I made a paracentesis June 20th, through which air passed freely on Politzerization. On the following day the wound was healed, the air passed freely into the tympanic cavity, but there was no perforation sound. This day for the first time there was no giddiness, and the cicatrix did not become tender again.

Now, Dec. 31st, the patient is well, the left ear is deaf, the right ear hears a whisper at 4 m., ordinary speech at 9 m.; with the right ear closed, whisper heard at 0.20 m., ordinary speech at 0.30 m., no better with the left ear open than with it closed. He has no tinnitus, no headache; has gained ten pounds in weight, and the naso-pharyngeal catarrh is so much better that the smell, which has been almost completely lost for years, has returned in a measure.

I have little to add in explanation of the course of the disease in these two cases; *mutatis mutandis*, they agree with Bezold's description. I would say a few words, however, in regard to treatment. I have not followed Bezold's plan of opening the process deeply and then breaking through the medial wall and placing a drainage tube in this cavity. With the great swelling of the soft parts, this seems to me a rather formidable operation, which perhaps when the perforation is recent and the pus has not burrowed far downward and backward in the neck, may be indicated. When the latter is the case, however, I scarcely believe that by this operation we can cause the pus in sufficient quantity to take a direction against the influence of gravity. The results in such cases so treated are not satisfactory. I believe that it would be better after the antrum had been sufficiently opened, to wait for an indication for making a counter opening. Where, as in my first case, the pus points, this is the most favorable spot for making the incision. When such is not the case, and the pus sinks down, forming a retro-pharyngeal abscess, there is still hope that, if opened at the right time and further sinking prevented, which may be often difficult, there may still be a *restitutio ad integrum*, as is shown in my second case.

It is manifest that the best course for the surgeon to pursue is to form as accurate an opinion as possible regarding the anatomical features in the course of the disease, and rather than always perform a fixed typical operation, to observe and individualize the case, and to assist nature at the right moment, which, although it has its own *vis medicatrix*, does not individualize, and in this way to follow Bacon's saying: *Non fingendum aut excogitandum, sed videndum quid natura faciat ac ferat.*

REPORT ON THE PROGRESS OF OTOTOLOGY DURING THE SECOND HALF OF THE YEAR 1891.

BY PROF. A. BARTH AND A. HARTMANN.

Translated by Dr. MAX TOEPLITZ, NEW YORK.

A.—NORMAL AND PATHOLOGICAL ANATOMY, HISTOLOGY, AND PHYSIOLOGY OF THE HEARING ORGAN AND OF THE NASO-PHARYNGEAL CAVITY.

By Ad. BARTH, MARBURG.

I.—ANATOMY.

a.—HEARING ORGAN.

1. Prof. G. SCHWALBE. Contributions to the anthropology of the ear, with one plate. "International Contributions to Scientific Medicine." Paper dedicated to RUDOLF VIRCHOW in celebration of the completion of his seventieth year of age. Vol. i.

2. HAUG, Munich. Contributions to the microscopical anatomy of the tumors of the external ear, with one plate. *Arch. f. Ohrenheilk.*, vol. xxxii., p. 151.

3. MAGGIORA, A., and GRADENIGO, G. Bacteriological observations upon furuncle of the external auditory meatus. (Observations bacteriologiques sur les furoncles du conduit auditif externe.) *Annales de l'Institut Pasteur.*

4. MAGGIORA, A., and GRADENIGO, G. Contribution to the etiology of the catarrhal inflammation of the ear. *Centralblatt für Bacteriologie und Parastitenkunde*, etc., 1891, No. 19.

5. KOELLIKER. Divisions of the cochlear nerve. *Verhandlungen d. anat. Ges. auf d. V. Vers.*, Munich, 1891.

6. Prof. Dr. HABERMANN, Graz. Nervous atrophy in the inner ear. Second communication. *Zeitschr. f. Heilkunde*, vol. xii., 1891.

7. Prof. Uj. HEIBERG. Thrombophlebitis sinus transversi in suppurations of the ear. From the paper published in honor of Dr. DANIELSEN, Bergen.

1. SCHWALBE has made anthropological measurements of the auricles in 211 individuals (109 men and 102 women), and observed the frequent occurrence of Darwin's pointed ear. Its greater frequency in the male is quite remarkable. The point is present in more than three quarters of all men and in nearly 75 per cent. of all ears, whilst among females hardly one half of the individuals and only one third of the ears present Darwin's point. It is, therefore, remarkable that in females the more primordial form is not present, as *e. g.* in the development of the genital organs, but the derivative form. The shortening is much more marked in the female. In addition the left ear in both series is on the average much shorter than the right. Schwalbe then gives sixteen measurements determining different indices, as in the measurements of the skull.

2. HAUG describes 12 cases of tumor of the external ear: 1. Perivascular fibroma at the lobulus, without cicatrix, the centre of which consists of fully developed, the periphery of young, connective tissue. 2. Fibroma without connection with the cicatrix, due to piercing the ear, with hyaline degeneration of the basement substance. 3. Cicatricial keloid of the lobule, due to puncture, in the superficial layers exhibiting the character of a cellular, firm fibroma (fibro-sarcoma), in the deeper that of cylindromatous keloid in the state of hyaline degeneration. 4. Chronic inflammatory, perivascular infiltration, probably consecutive to congelation of the ear lobe, partly with new formation of connective tissue, partly with separation of the tissue fasciculi by oedematous swelling in the reticular as well as in the deeper cutis layers. 5. Peculiar combination of angioma and tuberculosis of the ear lobule. 6. Soft fibroma from the cartilaginous meatus externus. 7. Lymphangioma terminating in fibrous degeneration, from the region of the tragus. 8. Chondromyxoma from the posterior surface of the auricle, probably of traumatic origin. 9, 10, 11, and 12. Four cases of carcinoma of the auricle. Haug, as a result of examination of a large number of carcinomata of the skin, especially of the four mentioned above, has arrived at the

conclusion that a great proportion of carcinomata of the skin originate from the interpapillary cones of the rete and that the lowest layer only of the cylindrical basal cells forms the proliferating epithelial stratum proper. Haug thinks himself justified in denying especially for the ear the development of carcinoma from the deeper layers.

3. MAGGIORA and GRADENIGO found in most cases of furunculosis of the external meatus the staphylococcus pyogenes aureus, then less frequently the albus and citreus. In two cases citreus and albus were found combined, in one case staphylococcus albus and bacillus pyocyanus. The latter is described in full.

4. Among sixteen of twenty cases the presence of pathogenic micro-organisms was demonstrated in the secretions of the naso-pharyngeal cavity and of the middle ear, viz., the staphylococcus aureus and albus were invariably found. From the cases examined we conclude that pathogenic micro-organisms must be present also in those affections in which they cannot be bacteriologically demonstrated without further investigations. Suppurative and catarrhal inflammations are due to the same micro-organisms. Mechanical or chemical irritation may produce a new inflammation, and also increase an old one.

5. KOELLIKER demonstrated a specimen with reference to the divisions of the fibres of the cochlear nerve. These are found in the ganglion laterale acustici, and seem to occur in all fibres of the cochlear nerve. Similar divisions, which resemble those of the sensory roots of the spinal nerves, are found also in the vestibular nerve. The specimen was that of a new-born cat, prepared according to Golgi's method.

6. HABERMANN continues his publications from vol. x. of *die Zeitsch. f. H.* III. and IV. follow as a description of the petrous bones of a woman, aged sixty-two. The condition is on both sides approximately the same. Fibrous atresia of the external auditory meatus and sclerosis (chronic inflammation) of the tympanal mucous membrane with formation of cysts. Atrophy of the nerves in the basal cochlear turn. Small hemorrhages in the mucous membrane of the tympanum and in the cochlea. In the latter fat embolisms (fatty degeneration). V. Fibrous thickening of the mucous membrane of the tube and membrana tympani, dislocation of the stapedial plate, degeneration of Corti's organ at the extremity of the basal cochlear turn, with atrophy of its nerves and ganglia. Fibroma in the trunk of the acoustic nerve (inner auditory meatus). VI. Cholesteatoma of the external audi-

tory meatus. Sclerosis of the middle ear with numerous cysts. Atrophy of the nerves in the lamina spiralis, and of the ganglionic cells in Rosenthal's canal. VII. Slightly pigmented cicatrix in membrana tympani. New formation of connective tissue in the middle ear. Atrophy of the cochlear nerves. VIII. Perforations of the membrana tympani. Sclerosis of the mucous membrane of the middle ear, with formation of cysts and occlusion of both fenestral recesses by connective tissue consecutive to purulent inflammation of the middle ear and labyrinth. Atrophy of the cochlear nerve. IX. and X. Purulent middle otitis which has run its course, and ostitis with recovery around the stapedial base, ankylosis of the stapes, atrophy of the nerve, hemorrhages subsequent to cholæmia. In conclusion Habermann deems it quite probable that the inflammatory process of the middle ear does not at first act through the bone upon the vestibule, but through the round window upon the lower cochlear turn. The atrophy of the nerve was in all cases principally quantitative, the number of nerve fibres being decreased as well as the ganglionic cells in Rosenthal's canal. It follows from the investigations that alterations in the nervous apparatus of the inner ear are of frequent occurrence, particularly also as a result of suppuration of the middle ear.

7. HEIBERG briefly reports eight cases of sinus thrombosis with autopsies. In one half of the cases the wall between the mastoid cells and the sigmoid fossa was found to be carious, in the other half to be intact. In six cases metastatic foci, usually gangrenous and offensive, were found in the lung. In two cases the pus was bacteriologically examined, and diplococci and bacilli were demonstrated. The thrombosis involved in three cases the vena jugularis interna, in one case the sinus petrosus superior and inferior, the cavernous sinus, and the vena ophthalmica. In the latter case considerable œdema of the face, and especially of the eyelids, was present. The diagnosis was not made *intra vitam* (the first three cases had occurred in the year 1871). In three cases the mastoid process was trephined. The histories and the anatomical description of the cases are not fully enough described to claim widespread interest.

UCHERMANN.

b.—NASO-PHARYNGEAL CAVITY.

1. SUCHANNEK, Zurich. Contributions to the normal and pathological histology of the nasal mucous membrane. *Anat. Anzeiger*, 1882, p. 55.

2. HASKE, TH. A new method of exposing the naso-pharyngeal cavity with its pneumatic appendices without disfiguring the cadaver. *Virchow's Archiv*, vol. cxxv., No. 2, 1891.

3. STÖHR, PH. The development of the adenoid tissue, the lingual follicles, and the tonsils in man. Paper commemorative of the fiftieth anniversary of VON NÄGELI'S and VON KOELLIKER'S graduation in medicine, dedicated by the university, etc., of Zurich, 1891. *Anatom. Anzeiger*, 1891, p. 545.

1. SUCHANNEK frequently found in the respiratory as well as in the olfactory region of man eosinophilous, puffy glandular cells, the physiological or pathological importance of which cannot up to date be determined. In two of many cases the presence of pigmented glands (in the olfactory region) which, he considers as an early appearance of old age, could be proven. In persistent rhinitides masses of secretion are frequently found in the lumen of the gland-ducts, as also frequently cellular masses adhering in lumps, which originated from glandular epithelium. This picture distinguishes chronic rhinitis from the acute form, in which the cells are separated from their connection and fall into the lumen of the tubulus. Wherever ciliated epithelium is injured, metaplastic changes take place. These can be studied in chronic rhinitides, especially in all stages of ozæna. As in the olfactory region, the metaphasia frequently begins in the respiratory region in the deepest epithelial layers, whereupon the surface loses the ciliated hairs, and flattening of epithelium sets in.

2. After removal of the brain, the skin of the skull is dissected off so as to lay bare the arches of the orbit, the nasal bones and the foramen occipitale; then the connection of the muscles of the nape of the neck with the skull is severed. A sagittal section is made with the saw, either to the right or left of the median line as may be necessary, about 0.3 cm from it, anteriorly through the nasal bones, posteriorly through the foramen occipitale, whereby the base of the skull is wellnigh entirely sawn through, except some bony bridges and the dental process of the second vertebra, which are now separated by the pointed saw. The nasal bones, the hard palate, the dental process of the superior maxilla can be pulled apart, permitting the dissection of non-dissected linings of mucous membrane of the nasal and naso-pharyngeal vault with the knife. On further pulling apart, the above-mentioned bone connections break without difficulty and without destruction of important parts, and the two halves of the

skull rotate around each axis, placed through the maxillary and atlas joints and open like a book. In most cases the nasal cavity of the side opened first can be well inspected, and after removal of the septum, that of the other side. If this is not the case, the base of the skull is cut through vertically to the sagittal section, to the right and left of the point where the upper wall of the naso-pharyngeal cavity passed into the posterior, until the lateral wall of the naso-pharynx is reached on either side. Furthermore, from the point where the sagittal section cuts the sella turcica, a section is made to the ends of the line described above, so as to cut a rectangular triangle out of each side of the base of the skull. The sphenoid as well as the nasal cavities are thus widely exposed. The infundibulum, septum, and antrum of Highmore, frontal sinuses, and ethmoidal cells can now be readily opened.

The removal of the organ of hearing, according to Schalle or Politzer, can be added to this method. This method has the advantage of taking but little time, of requiring no assistants, no complicated array of instruments, no involved technique or extensive knowledge of anatomy. It fully preserves the turbinate bodies and infundibulum, which are always destroyed by Schalle's method. Schalle's method has the advantages of including the hearing organs, of preserving the natural picture of the naso-pharynx and *aditus ad laryngem*, and of removing the specimen *in toto* so as to facilitate its preservation.

MAX TOEPLITZ.

3. Adenoid tissue is formed by mesenchyma, which is transformed into reticular connective tissue, and by derivatives of the circulatory system, viz., the leucocytes. In the further development new leucocytes are added in part from the blood-vessels and partly by division of those emigrated before. The migratory cells only, derived from connective-tissue cells, play an important part in the formation of new reticular tissue. The *human tonsil* develops from a sulcus situated between the second and third pharyngeal arches, which is lined by a continuation of the oral mucous membrane. Striated epithelium and young connective tissue are here found, but no free leucocytes. Proliferations of epithelium then arise where the system of fissures is developed. From about the third foetal month until after birth leucocytes emigrate from the blood-vessels, and transform the young fibrillary connective tissue into adenoid tissue. The free leucocytes act probably as agents in the processes of absorption.

II.—PHYSIOLOGY AND PHYSICS.

a.—HEARING ORGAN.

1. LORENZ, C. Investigations upon the perception of differences of sound. *Philosoph. Studien*, vol. v., p. 26.

2. BING, ALBERT. A new experiment with the tuning-fork. *Wien. med. Blätter*, 1891, No. 41.

3. VERWORN, MAX. Equilibrium and otolithic organ. Paper written on assuming lectureship—Jena. Bonn, 1891.

1. The author, writing under Wundt's supervision, arrives at the following conclusions: 1. We have the faculty of comparing with each other finite differences of sound dependent upon affinity of timbre, and of measuring them. 2. The differences of sound sensations are almost entirely proportionate to the number of vibrations (pitch).

The method of the imperceptible differences may be applied to the sensations of sound and is not limited to the comparison of intensities of light, as has heretofore been almost generally assumed.

2. BING describes a new experiment with the tuning-fork, placing, as in Rinne's experiment, the tuning-fork upon the mastoid process and occluding the external meatus after the sound is no longer perceived. The sound will reappear under normal conditions. This physiological fact is made use of in the well-known methods employed for examination of hearing.

3. VERWORN examined the ænophores, and ascertained above all their position of equilibrium after removal of the otolith. The position of equilibrium was lost and the movements of the animal became irregular. The otoliths, having nothing to do with the function of hearing (which seems to be absent in these animals), are called statoliths by the author.

b.—NASO-PHARYNGEAL CAVITY.

1. ZWAARDEMAKER, H. Formula for the acuteness of smell. (Norme de l'acuité olfactive [olfactie].) *Cz. Arch. Néerlandaises*, vol. xxv., p. 131.

2. GUILLAND G. LOVELL, M.D., F.R.C.P. Ed. On the function of the tonsils. Read before the Medico-Chirurgical Society of Edinburgh, July 8, 1891.

1. ZWAARDEMAKER uses a cylinder filled with odorous substances to determine the normal acuteness of smell (olfactia), and its impairment is expressed in fractions of the normal, as in examination of the acuteness of vision or of audition. The greatest fault of the entire method consists in the fact, that the measuring instrument is not constant and that an especial examination must be made for each smelling substance.

2. The tonsils—viz., the palatine, lingual, and pharyngeal tonsils—are organs for the production of leucocytes. They increase principally by mitotic division. The newly formed leucocytes are partly retained in the lymph vessels, thus remaining partly in the tonsils as "stationary" cells, or in part emigrate upon the surface, passing through the epithelium. They intercept here foreign bodies, especially micro-organisms which would otherwise penetrate the tonsils. The lingual and palatine tonsils, and the diffuse infiltration with leucocytes upon the lower surface of the soft palate, form a protective wall between the mouth, which is flooded with micro-organisms, and the remaining digestive apparatus, the pharyngeal tonsil and the upper surface of the palate forming the protective ring for the respiratory tract. The continuous production of leucocytes is sufficient to maintain a current leading outward and to prevent the penetration of foreign bodies. Under certain conditions, as, *e. g.*, in general debility, this current may be interrupted, as also the formation of leucocytes. The pathogenic organisms are thus enabled to enter the tonsils and to cause local or general infectious processes.

B.—PATHOLOGY AND THERAPEUTICS OF THE HEARING
ORGAN AND OF THE NOSE.

By A. HARTMANN, BERLIN.

a.—GENERAL LITERATURE.

1. Prof. E. BEZOLD, Munich. Statistical report on the ear patients treated from the year 1887 to 1889 inclusive. *Arch. of Ohrenheilk.*, vol. xxxii., p. 113.

2. PANSE. Report of work done at the aural clinic of the Royal University of Halle from April 1, 1890, to March 31, 1891. *Ibid.*, p. 38.

3. MARIAN. Report on ear cases treated from 1887-1890.
Ibid., p. 161.
4. GELLÉ. Aural clinic annexed to the hospital of the Salpêtrière (service of Prof. CHARCOT). Statistics of 1890. *Progrès Médicale*, 1891.
5. COHN, MICHAEL. Nystagmus in aural affections. *Berl. klin. Wochenschr.*, 1891, No. 43.
6. HESSLER, Halle. Aural affections after simple operations in the nose. *Münch. med. Wochenschr.*, 1891, No. 50.
7. WÜRDEMANN, H. V. Acute suppuration in the middle ear and facial paralysis following the use of Eustachian bougies. *Ophthalmic Record*, December, 1891.
8. TIBBETS, L. A remarkable case of gunshot wound of each ear with recovery. *Medical Record*, November 7, 1891.
1. BEZOLD'S report is the seventh of his triennial reports ; 4,473 patients with 4,867 affections were examined. From the abundance of experience, to which justice cannot be done in a brief review, we emphasize the fact, that Bezold because of exact application of his principles of examination has found a much more considerable number of pure or wellnigh purely nervous affections than in the former triennia, while the number of otitis media chronica without retraction of the membrana tympani decreased. Furthermore, Bezold gives a detailed explanation of the possibility, by exclusively functional examination, of defining or differentiating sharply those two forms of disease which, because of their meagre or completely negative result, have heretofore offered the greatest difficulty in diagnosis, viz., chronic sclerotic processes of the middle ear, and nervous deafness. Bezold observed 52 cases of otomycosis. In a case of congenital atresia of the external auditory meatus and of rudimentary auricle the rudimentary organ could be examined *post mortem*. A complete defect of the annulus tympanicus was found. This condition being found repeatedly with great regularity, Bezold considers the formation of an artificial meatus as of no avail. Bezold found in one case the very rare condition of petrifaction of old epidermal masses in the external meatus. The firm stony concretions were "enclosed in thick offensive scales of epidermis and showed completely the tubercular structure and appearance of sequestra of spongy bone substance." RUMLER (Berlin).

2. At the aural clinic at Halle 1,605 out-patients and 172 inpatients were treated. "Excision of the malleus through the external meatus was done 29 times, which in 14 cases was associated with extraction of the incus." PANSE advocates the operation through the external meatus and also the removal of the ossicles, "since, as a matter of principle, the removal of the carious malleus only must be considered as a half measure." The facial nerve was paralyzed by the operation in but one case during the year of the report. The result of chiselling of the mastoid process according to Stacke's method, viz., with horizontal separation of the membranous posterior wall of the external meatus, could be well judged from a specimen obtained by autopsy. The patient had died a month after the operation. The bone of the common cavity formed by external meatus and antrum was completely filled with young connective tissue, which extended into the various fissures of the spongiosa, and the epithelium of the external meatus had proliferated even into the remotest portions of the cavity, corresponding to the posterior wall of the antrum. In the further progress the entire cavity would thus have been lined by epidermis and the suppuration of the walls come to a standstill. In carcinoma of the external meatus Lysol was used at first in 2 per cent. solution, later in $\frac{1}{2}$ per cent., but the latter caused an intense burning sensation and did not remove the odor. Treatment, strictly carried out with tetraboracic acid had no favorable result; the affection was not essentially influenced, and unbearable burning was frequently produced. Opening of the antrum by operation was performed in 67 cases: in 27 with permanent, in 15 with temporary, result; in 3 without result, and in 3 with unknown result; 13 cases remained under treatment; 6 died, one patient who died having in addition carcinoma ossis petrosi. RUMLER.

3. Eleven hundred and eighty-six patients were examined and treated by MARIAN. From his "clinical remarks" we emphasize the following points: Ten cases of "Rupture membr. tympani," 5 of which were in the right, 5 in the left ear. In six cases the injury was caused by a blow with the hand, and singularly in 3 cases upon the right ear. The nature and seat of the injury were characterized as follows: 1. "Oval perforation in front of the handle of the malleus." 2. "An oval opening runs from the handle of the malleus horizontally backward" (after $2\frac{1}{2}$ months, complete recovery). 3. "Rupture in the anterior superior quadrant in front of the handle of the malleus. In four

weeks, perforation somewhat reduced, hearing distance considerably improved." 4. "Blow upon the ear two months ago. Lacerated wound with indented margins in front of the umbo. Recovery with considerably diminished hearing distance." 5. "Seat of perforation in antero-inferior quadrant." 6. "Perforation in postero-superior quadrant." In one case there existed after a fall upon the right side of the head a flap-like laceration behind the handle of the malleus. Complete recovery with normal hearing-distance in a week. In two cases the injury was caused by piercing with a knitting-pin : in the first case "indented opening near the handle of the malleus ;" in the second case, "small perforation in front of the handle of the malleus." In one case, injury following the piercing with a penholder ; large perforation in front of the handle of the malleus.

RUMLER.

4. GELLÉ in this important paper discusses the different cases, which occurred at the clinic during the year 1890. The connection of the clinic with an institute for nervous diseases is of especial interest. The author then discusses the relations of deafness and disturbances of hearing to hysteria, neurasthenia, facial neuralgia and paralyses, vertigo, tabes, chorea, epilepsy, etc. His observations prove the difficulty of problems to be solved by the aurist, and the necessity of employing all methods of examination in making an exact diagnosis.

GELLÉ, Paris.

5. In the first case described by COHN, otitis media purulenta chronica, a vertiginous attack was induced by intensification of the aërial pressure, for which purpose pressure upon the tragus sufficed, with a tendency of falling toward the opposite side, and with, simultaneously, extreme horizontal nystagmus of both eyes. For the explanation of this phenomenon Cohn assumes an irritation of the labyrinth produced by the aërial pressure upon the labyrinth, which is hypersensitive because of the inflammation. In the second case fainting spells and rotatory nystagmus occurred during irrigation of the ear, affected by an old otitis media purulenta chronica. In the third and fourth case, the ear, with an extensive perforation of the drum-membrane, was syringed with cold water, whereupon intense vertigo and nystagmus took place.

RUMLER.

6. HESSLER observed during two years nine cases of this kind, one being in his own practice. The cases collected from literature of the subject amount also to nine. The difficulty of drawing inferences from these numbers as to the frequency of these

sequelæ is well-known to every aurist. *Reviewer*, e. g., has observed during six months two severe cases of suppuration of the middle ear, following immediately after resection of the nasal septum in one case, and chiselling of a spina in another. Hessler warns against unnecessary operations, advocates the strictest possible antisepsis and the prevention of complications in the operated patients. Plugs ought not to remain *in situ* longer than twelve hours.

MÜLLER, Stuttgart.

7. WÜRDEMANN was treating a case of stricture of the Eustachian tube by bougie, when suddenly there developed an acute suppuration of the drum cavity associated with facial paralysis on that side. He thinks the infection came from the bougie, which had not been properly cleansed and made aseptic. Recovery from the inflammation and paralysis was complete.

SWAN M. BURNETT.

8. In TIBBET'S case, a man attempted suicide by shooting himself through the meatuses of both ears. The bullets were distinctly felt and efforts made to extract them but without avail. The finger could be passed two inches into either meatus. The wounds were kept clean, and after healing his hearing was sufficient to enable him to follow his occupation as a hackman.

SWAN M. BURNETT.

b.—INSTRUMENTS AND METHODS OF EXAMINATION.

9. BLOEBAUM, Coblenz. A celluloid ear speculum. *Monatsschr. f. Ohrenheilk.*, 1891, No. 9.

10. TURNBULL, LAWRENCE. Artificial drums. *Medical News*, August 1, 1891.

11. LUBET-BARBON. The palate hook and its application. (Du reveleur du voile et de son application.) *Arch. internat. de laryngol., de rhinol., et d'otologie*, 1891, No. 4.

12. VULPIUS. Remarks on the technique of the galvano-cautery. Description of a new nasal burner. *Arch. f. Ohrenheilk.*, vol. xxxii., p. 195.

13. BISHOP, S. S. Improved ear electrodes. *Four. Amer. Med. Assoc.*, October 31, 1891.

14. LAMANN, St. Petersburg. The incandescent lamps and the interpolation of resistance in the use of accumulators. *Monatsschr. f. Ohrenheilk.*, etc., 1891, No. 11.

15. BING, ALBERT, Vienna. A new experiment with the tuning-fork. Contribution to the differential diagnosis of the diseases of the mechanical conductive and of the nervous apparatus of hearing. *Med. Blätter.*

16. ZIEM, Dantzig. Palpation of the naso-pharyngeal cavity. (Du toucher de la cavite naso-pharyngienne.) *Arch. internat. de laryngol.*, etc., 1891, No. 6.

9. BLOEBAUM praises his specula made of celluloid as being very light, infrangible, good reflectors of light, and resistant to astringents. In using the galvano-cautery the danger of their taking fire must not be forgotten. (They are manufactured by B. B. Cassel, Frankfort-o-M.)

KILLIAN.

10. TURNBULL has tested all forms and varieties of artificial drumheads and has found the simple ones of antiseptic gauze, wool, absorbent cotton, oil silk, or fine rubber the best. He finds that they rarely improve hearing materially. His experience with aristol as an antiseptic in ear diseases is not satisfactory. He finds iodoform preferable.

SWAN M. BURNETT.

11. Unless patients are very easy to examine LUBET-BARBON thinks the use of the palate hook necessary for rhinoscopy posterior in order not to lose too much time or for the greater safety in operative procedures in the naso-pharynx. He recommends the hook devised by Moritz Schmidt.

BOK, Berlin.

12. VULPIUS requires for the better utilization of the electro-motor power, the smallest possible resistances of conduction by using copper wires not too thin, and by placing a broad well-conducting contact at the handle. He used as burner a platinum wire, "which is less injurious to the adjoining parts by radiating heat and acts more rapidly and intensively than a flat burner." Vulpian describes his hot snare, which has proven very efficient during its application for several years." "A semi-circular platinum snare, about 2.5 cm long and 0.4 mm thick, connects two free limbs of copper wire (1.2 mm thick) or still better of silver wire, which are 11 cm long and converge to the handle. These limbs are covered with metal varnish, separated by a small ivory plate, cross each other at the angular curve used in nasal instruments and end in short and thick pieces, which connect them with the handle."

RUMLER.

13. BISHOP uses as electrodes for the application of electricity to the ear two metallic cones covered with chamois fitted into the

meatus and held in place by an elastic band buckled around the head.

SWAN M. BURNETT.

14. LAMANN discusses the use of storage batteries for illumination, galvano-cautery, and faradisation. He emphasizes the fact that the incandescent lamps used for different purposes require different amounts of strength of current (ampères), electromotor power (volts) and interpolated resistance (ohms), in order to produce the best illuminating effect. This holds good also for apparently the same lamps. The electromotor power is increased and diminished by the number of interpolated accumulators. The strength of current is regulated by the rheostat which should be composed in incandescent lamps of spirals of genuine silver wire, on account of sufficient graduation of the resistances. For galvano-cautery instruments fewer accumulators (1 to 2 placed behind each other) are required and rheostats which permit of interpolating smaller resistances than those mentioned above, viz., those of copper wires, for the burners offer a considerably smaller resistance to the current than the lamps. The accumulator can also be used for the production of the primary current in induction apparatuses ; it is, however, not of especial value, except in those apparatuses which are not composed of too thin a wire.

KILLIAN.

15. If a vibrating tuning-fork of medium size and pitch is placed upon the median line of the skull as in Weber's experiment, or, still better, as in Rinné's upon the mastoid process, the sound is perceived from the median line or in the corresponding ear respectively until it dies out. If then, while the tuning-fork is still kept upon the same place in contact with the bones of the head, and after the sound has disappeared, the operator places the finger in the external meatus, occluding it moderately, the sound reappears and is still perceived for some time. This renewed perception of the sound of the tuning-fork is called by BING secondary perception, in distinction from the former primary perception which has just died out. The return of the sound after occlusion of the external meatus is called the positive experiment, the result being negative if the sound of the tuning-fork does not reappear after occluding the meatus. The positive result is a normal phenomenon ; the negative, however, points to impediment of conduction, to an affection of the middle ear. The duration of secondary perception can be made use of with reference to the duration of primary perception for differential

diagnostic purposes, an essentially shortened duration of secondary perception with prolonged or unabridged duration of primary perception pointing to a medially located resistance. According to Bing this new experiment is a better test for the diagnosis of impediment of conduction of sound than Rinne's experiment.

POLLAK.

16. ZIEM prefers the examination of the naso-pharyngeal cavity with the finger to the examination with the mirror or palate-hook respectively. In children palpation only can be used. Other patients prefer it to the introduction of mirror or palate-hook. In certain cases, as *e. g.* in hypertrophy of the posterior ends of the turbinate bodies, abscesses in the region of the pterygoid processes of the sphenoid bone, it leads to positive results. In addition the operations in the naso-pharynx are facilitated by the simultaneous introduction of the examining finger.

BOK.

C.—EXTERNAL EAR.

17. FOSTER, M. L. Traumatic occlusion of the external auditory meatus. *N. Y. Med. Jour.*, July 18, 1891.

18. LICHTENBERG, Budapest. A case of osteoma of the cartilaginous portion of the external auditory meatus. (*Un cas d'ostéome de la portion cartilagineuse du conduit auditif externe.*) *Revue de laryng.*, etc., No. 19, 1891.

19. KRAKAUER, Berlin. A case of multiple formation of exostoses upon the skull with facial atrophy of one side. *Monatsschr. f. Ohrenheilk.*, No. 10, 1891.

20. SOULS, FERDINAND. Contribution to the study of otomycosis. *Bordeaux*, 1891.

21. PRICE, GEO. H. Wheat in the ear. *Ophthalm. Record*, September, 1891.

22. Prof. BEZOLD, Munich. Operative removal of foreign bodies from the tympanic cavity, with ablation of the soft parts lining the osseous portion of the external auditory meatus, and chiselling of the margo tympanicus. *Berliner klin. Wochenschr.*, No. 36, 1891.

17. FOSTER gives the history of the case of a boy of eleven years who was injured by a heavy box falling on him, making a lacerated wound which separated the lobe of the right ear from the cheek, and also caused a wound within the auditory canal on

its anterior wall, through which a probe could be passed towards the median line under the right cheek to the outer canthus of the eye. He was seen by Foster three months later, and the external meatus was found to be occluded by a mass of tissue covered by integument and situated a quarter of an inch internal to the tragus. A small opening was found in the upper outer quadrant, which led into a larger cavity. This opening was dilated with a Weber's probe and a piece of indiarubber drainage-tube introduced in the following manner : A bit of rubber tubing was stretched over a probe which held one end of the tubing fixed by means of its forked extremity. The probe, with the tube tightly stretched over it, was introduced into the cavity and the free end of the tube released, thus causing it to assume its natural size. This made constant and even pressure on the sides of the opening. After some days a larger tube was introduced in the same way. His hearing power has been very much increased.

SWAN M. BURNETT.

18. LICHTENBERG reports a case of osteoma of the cartilaginous portion of the external auditory meatus, which he removed by operation. This is, according to the author, the first published case of the kind, whilst osteomata of the osseous portion of the external auditory meatus are not of rare occurrence.

BOK.

19. This affection was observed in a scrofulous girl of twelve years. In addition to other exostoses upon the skull one external meatus presented formation of exostoses, which, after ablation of the auricle, were found to be three in number, attached by broad bases to the postero-superior wall of the external auditory meatus. *They were chiselled off in one piece together with their bases.* Recovery took place without complication ; otorrhœa ceased.

KILLIAN.

20. The following fungi occur in the external auditory meatus, according to the author's careful investigations : Aspergillus fumigatus, flavescens, nigricans, malignus, nidulans, Eurotium aspergillus repens, Verticillium graphii, Penicillium glaucum, Mucor corymbifer, septatus, and Microsporon fufur. They occur principally during the ages of sixteen to twenty. The male sex furnishes the greatest number (two thirds), and among these, principally gardeners, farmers, and those residing in ill-ventilated rooms (Russians). Sequelæ of mycosis are otorrhœa serosa, purulenta,

otalgia, deafness, tinnitus. The liability to invasion is favored by superficial inflammation, epithelial abrasion, the presence of ceruminal plugs, or by otorrhœa. Occasional causes are the introduction of fat, water, or instruments. Fungi have never been found in the cartilaginous portion of the meatus or on the auricle. The diagnosis is based upon the partly characteristic appearance of the microscopical specimens. In some cases it is necessary to prepare cultures. The prognosis is always favorable. The treatment consists in the removal of the membranes formed by the fungi, and in irrigations with antiseptic solutions (?). Fat ought not to be used.

BOK.

21. PRICE, in removing some impacted cerumen from the ear of a girl of sixteen, found a hard substance lying close to the membrana tympani. He finally got it away with instruments and on examination it proved to be two grains of wheat which must have got in at least ten years ago. SWAN M. BURNETT.

22. The foreign body was a stone of the form of a quadrilateral, flat pyramid, "the base of which was of an oval, bean-like shape, corresponding entirely to the transverse section of the osseous external auditory meatus in its inner portion"; by improper attempts at extraction the stone was pushed forward into the tympanic cavity, where it was firmly wedged in. "The procedure used in this case for the removal of the foreign body from the tympanum differed in two respects from the usual methods: (1) After ablation of the auricle the cartilaginous portion was not separated from the osseous, but the soft parts were dissected according to Stacke as a whole from the meatus; and (2) it was not necessary to chisel off the external meatus from the outside, but it sufficed to chisel around the membrana tympani in the innermost portion of the meatus." A small hook of soft iron was used for rolling the stone out of the cavity. Recovery *per primam* without stenosis of the lumen of the external meatus.

RUMLER.

d.—MIDDLE EAR.

23. MIOT, C. Deafness caused by the membrana tympani or the ossicles in dry otitis media, and means of remedying the same. (De la surdité déterminée par le tympan ou les osselets dans d'otite moyenne sèche, et des moyens d'y remédier.) *Revue de laryngol., d'otolog., etc.*, 1891, Nos. 16 and 17.

24. UTKE, LARSEN, Copenhagen. Thirteen cases of partial deafness with stricture of the Eustachian canal treated by electrolysis. *Nord. med. Arkiv.*, vol. xxiii., No. 10.
25. MÜLLER. Remarks on the clinical importance of certain perforations of the membrana tympani. From the aural clinic at Jena. *Arch. f. Ohrenheilk.*, vol. xxxii., p. 85.
26. HAUG, Munich. Snuff tobacco as a cause of acute otitis media. *Ibid.*, p. 171.
27. WÜRDEMANN, H. V. Erysipelas and acute suppuration in the middle ear. *Medical News*, November 21, 1891.
28. BURNETT, C. H. Excision of the membrana tympani, malleus, and incus as a means of treatment in otitis media catarrhalis chronica and in otitis media purulenta chronica. *Four. Amer. Med. Assoc.*, September 26, 1891.
29. LUC. Two cases of recovery of chronic suppuration of the tympanum as a result of excision of the malleus. (Deux cas de guérison de suppuration chronique de la caisse à la suite de l'excision du marteau.) *Arch. intern. de lar.*, etc., 1891, No. 5.
30. UCHERMANN, Christiania. Caries of the head of the malleus. *Magazin for Lagewidensk.*, October, 1891.
31. GELLÉ. Otitis purulenta, cerebral symptoms subsequent to posterior plugging in severe epistaxis. (Otite suppurée, accidents cérébraux à la suite du tamponnement postérieur dans une epistaxis grave.) *Bull. de la soc. de laryng.*, etc., November 6, 1891.
32. DENCH, E. B. Chronic non-suppurative inflammation of the middle ear. *N. Y. Med. Four.*, September 26, 1891.
33. WÜRDEMANN, H. V. Primary periostitis of the mastoid. *Four. Amer. Med. Assoc.*, October 31, 1891.
34. SCHENCK, H. D. Mastoid periostitis. *Four. Ophth., Otol. and Laryng.*, October, 1891.
35. POULSEN, K., Copenhagen. Cerebral affections subsequent to chronic otitis media. *Nord. med. Arkiv.*, xxii., Nos. 8 and 15.
36. JOURDANET, L. G. Contribution to the study of cerebellar abscesses consequent to otitides. (Contribution à l'étude des abcès du cervelet consécutifs aux otites.) *Thèse de Lyon*, 1891.
37. JANSEN, Berlin. Cerebral abscess due to aural affection. *Berliner klin. Wochenschr.*, 1891, No. 49.

38. MAX, EMANUEL, Vienna. Bilateral necrosis of the cochlea with consequent meningitis and exitus letalis. *Wiener med. Wochenschr.*, 1891, Nos. 48-51.

23. MIOT, in cases of deafness due to dry otitis media employs two methods of operation. In the first the membrana tympani and the handle of the malleus are excised. In the second (radical) the drum-membrane, malleus, and incus are extirpated. The operation is based upon the idea of the necessary preservation of the artificial opening in the membrana tympani. The removal of the membrana tympani and of the handle of the malleus is sufficient, if the drum-membrane is considerably thickened, if the chain of ossicles is freely movable, and if the formation of a cicatricial membrane is not to be dreaded. (Such cases are probably very rare,—H. K.) If the mobility of the ossicles, however, is impeded and cicatrization in place of the drum-membrane is expected or has taken place, the entire malleus and incus should be removed. During the operation the chorda tympani and the stapes ought not to be injured. After a properly done operation no complication occurs, except a discharge, more or less considerable which in most cases rapidly ceases. The result is extremely favorable with reference to tinnitus and deafness, the latter being frequently improved to an astonishing degree. For the after-treatment vaseline with a small addition of iodine is recommended. In conclusion the author reports five cases treated according to this method, in which the result was very favorable.

BOK.

24. LARSEN UTKE has used electrolysis for stenosis of the Eustachian tube (in thirteen cases), as described in the *Lancet* by Dr. Stevenson on November 24, 1888 (in seven cases). He rejects the method since it has not even fulfilled the most modest expectations.

E. BREMER.

25. MÜLLER distinguishes perforations, apart from their causes, according to their seat, form, size, and number. From the perforations in the lower portion of the drum-membrane, situated intermediately between the handle of the malleus and the bony furrow, and occurring in acute processes of the middle ear, Müller separates those located at the *light reflex* as an especial subdivision, because of their more unfavorable prognosis; they close more slowly and cause extreme disturbances. The closure of the perforation is rendered difficult by the fact that the fibres at the

light reflex are shorter and more strongly stretched than those of the surrounding radiating fibres, and that they are to be considered as an attaching ligament for the lower extremity of the handle of the malleus. Hence it follows, that in more or less considerable destruction of the fibres at the light reflex, the handle of the malleus, deprived of its normal lower attachment, is retracted inward, that the radiating fibres of the membrana tympani adjoining the light reflex become more tensely stretched, and that their normal nutrition and regenerative power are thereby interfered with. *Central* perforations are called by Müller, "those which are situated close to the lower extremity of the handle of the malleus, having destroyed the radiating fibres which are free from circular fibres." The central perforations occur at first as *kidney-shaped*, then with increasing destruction of the margins of the perforation as *heart-shaped*, and finally as *complete perforations*. Müller discusses the treatment of all above-mentioned perforations, which consists especially in tenotomy of the tensor tympani. If the stapedial plate is movable, the labyrinth pressure is thereby relieved, and subjective noises, headache, and vertigo are thus removed.

"In large defects of the membrana tympani, particularly in its destruction, the upper margin excepted, with foreshortening of the handle of the malleus, and also in complete perforations, the tenotomy is followed by extraction of the malleus, or that of the malleo-incus respectively," this being the only means of definite cure of otorrhœa. Müller proves the correctness of his views by nine histories of cases (in six patients with perforation at the light reflex, two with kidney-shaped and one with heart-shaped perforation). "In all cases the discharge ceased after a few days, frequently the next day in those patients who were treated for suppurative otitis media (six cases)." The perforation became smaller, in seven cases the hearing improved, "and in two cases tenotomy removed completely the distressing subjective symptoms."

RUMLER.

26. The patient, who was not an habitual snuff-taker, had sneezed violently after a snuff. "He intended to suppress the expiration and sneezed with the mouth entirely closed and the head inclined downward." The left ear felt at once "like beaten," Intense pain and deafness. Three days later the patient was examined by HAUG. The patient had never suffered from aural disease. An extreme otitis media was found in the left ear.

After paracentesis a small amount of blood escaped with the purulent discharge from the wound, and in the cotton introduced for the absorption of the secretion granules of snuff tobacco were detected. The following day three small granules of snuff-tobacco were removed.

RUMLER.

27. WÜRDEMANN gives the history of three cases of acute suppurative otitis media which were accompanied by severe erysipelas of the face. He thinks the ear lesion was the starting-point of the erysipelatous attack.

SWAN M. BURNETT.

28. The indication for the excision of the membrana tympani and the two large ossicles are considered by BURNETT to be : 1. The deafness, tinnitus, and vertigo of otitis media catarrhalis chronica, especially where adhesions exist between the membrana and the promontory, or there is evidence of synechiæ between the ossicles. 2. The suppuration, deafness, tinnitus, vertigo, headache, and recurring earache of otitis media purulenta chronica. The operation is done in all cases under an anæsthetic. The initial incision in cases of chronic catarrh is made behind the short process of the malleus and the incus-stapes joint exposed. The incus is then detached from its connection and removed. The tendon of the tensor tympani is severed, and then the membrana tympani, by a sweep of the knife, detached at its periphery and drawn out with the malleus attached. In none of the cases has he done the operation until all other rational means had failed. In no case of chronic catarrh has any bad result followed even when no good was accomplished. There was nearly always a relief from the sensation of pressure and fulness in the ear, the next most constant result being a relief from tinnitus and aural vertigo. There was less frequently an improvement in hearing.

In cases of chronic otitis media purulenta the operation has not failed to stop suppuration in any case in which the writer has employed it, and in attic cases with a normal atrium, and with a perforation only in the membrana flaccida it is the only remedy. Hearing generally improves, and the vertigo, headaches, tinnitus, and frequent "gatherings" are permanently relieved.

These are the general results arrived at by the author from a considerable experience, but no individual cases are given.

SWAN M. BURNETT.

29. LUC reports two cases of chronic suppuration of the middle ear with recovery after extraction of the malleus. The operation

is indicated if the malleus (or the ossicles) form the starting-point for the chronic suppuration, or if an exact curettement of the entire tympanic cavity cannot be carried out until after the extraction of the malleus.

BOK.

30. UCHERMANN presented a patient before the Medical Society of Christiania, whose malleus had been removed for offensive purulent otorrhœa of long standing. He cautions against their immediate removal in every case of caries of the ossicles, particularly when the hearing is still well preserved (whisper heard at a distance of 2-3 metres). In many cases drugs are still of value. It is of importance with respect to hearing whether the incus is also removed or not. In many cases the removal of the malleus only is sufficient, even if the incus is implicated. The advantages are, that the malleus can be excised with little loss of membrana tympani, and with safer and greater cicatrization. In these cases the result, so far as concerns hearing, is usually better than with simultaneous removal of the incus, provided that it is still connected with the stapes. It is, at any rate, not difficult to remove the incus afterwards, if necessary, in order to stop the discharge more rapidly.

UCHERMANN.

31. GELLÉ enumerates the frequency of purulent otitis media after posterior plugging of the nose. This complication, which is very familiar to every specialist, is still quite unknown to many general practitioners. The author demonstrates, that the cause is not to be looked for in the character of the plug, but that plugging itself is injurious, and the longer the plug remains in place the greater is the danger. It should be added that epistaxis may be a symptom of otitis media. In the discussion, following this communication, Saint-Hilaire, Chatellier, Lubet-Barbon, Luc, and Gouguenheim agree as to the injuriousness of posterior plugging and its frequent uselessness in the treatment of epistaxis, which, as it is well-known to-day, arises most frequently from the anterior portion of the nasal septum.

GELLÉ.

32. In this article DENCH gives the results of the treatment of thirty-eight carefully observed cases of chronic non-suppurative inflammation of the middle ear. Of the thirty-eight cases six were practically cured, twenty-eight were improved, three were unimproved, and one was made worse. As tests he uses the whispered voice and tuning-forks. Of the latter he uses five, varying in vibration from C to C^{IV}. The majority of those

reported cured were young, though the disease had existed for periods varying from one to several years. The exact amount of improvement in those who were simply improved is not stated. The treatment consisted in inflations generally with the catheter, followed in some cases by vapor of iodine and camphor introduced through the catheter. The author thinks the benefit is derived solely from a mobilization of the stiff tissues and not from an opening up of communications of the drum cavity with the outer air. He has tried other forms of mobilization from the exterior, and he thinks with benefit. The use of various ear trumpets for a certain period each day, he thinks very beneficial in its direct action on the membrana and ossicles, and also on the cerebral centres for hearing.

SWAN M. BURNETT.

33. WÜRDEMANN gives the history of two cases of periostitis of the mastoid which he considers primary. In both there was fever. In the first, a woman of thirty, the hearing was normal and the membrana tympani showed no changes. A Wilde's incision gave relief to the pain and swelling; no pus found. The second case, a man of fifty-four, had some middle-ear trouble with perforation of the drumhead. A Wilde's incision gave escape to a quantity of pus, and revealed a soft spot on the surface of the bone. All the symptoms were relieved.

SWAN M. BURNETT.

34. In SCHENCK'S case there was an acute purulent otitis media in a boy of fourteen years which had been treated with insufflations of boric acid for some time before he saw him. There was at that time a swelling behind the auricle and above it, which gradually travelled forward to the temple. As soon as it was beyond the temporal artery an incision to the bone was made. No pus was found, but the bleeding was profuse. Pain was relieved at once and the ear was treated by peroxide of hydrogen. Schenck thinks the trouble could have been avoided by a thorough cleansing of the ear at the beginning and the avoidance of the boric-acid powder.

SWAN M. BURNETT.

35. POULSEN reports in his full and elaborate paper, which is worth reading, thirty-six cases, of which four recovered and thirty-two died. There were thirteen cases of cerebral abscess with two recoveries, twelve of sinus thrombosis with one recovery, ten of meningitis with one recovery, and one of *hæmorrhagia meningalis basis cerebri*. If chronic otitis media is followed by

cerebral symptoms and if retention of pus in the tympanic cavity or in the mastoid process can be excluded, there are four complications to be considered, viz., cerebral abscess, meningitis, sinus thrombosis, and episcleral abscess. The diagnosis can be easily made if the various symptoms are very much marked. In most cases, however, the nature of the disease is so obscure as to render even diagnosis of a probability quite difficult. The cerebral abscess is usually located in the temporal lobe (nine cases ; seven adults, two children), less frequently in the cerebellum (four cases ; three adults, one child). It is frequently latent, without fever and without objective symptoms. Death may ensue occasionally by perforation into the ventricles or by diffuse meningitis. Headaches (partly in attacks), nausea, vomiting, vertigo, fever and retardation of pulse are usually met with ; less frequently pareses and convulsions (strabismus, disturbances of speech, etc.). These symptoms are not pathognomonic, though the retarded pulse is more so, although it also occurs in extensive epidural abscess. Rigidity and increased sensibility of the muscles of the nape of the neck were present only in one case. The variation of sensory symptoms is of value in the diagnosis, and especially for differential diagnosis the well-nigh exclusive occurrence of the abscess in chronic otitis media may be predicated.

The pathologico-anatomical examination of the abscesses in the temporal lobe gives the following result : Carious destruction of the tegmen tympani (2 cases), circumscribed purulent meningitis of the lower surface of the lobe and adhesion with the pars petrosa (3 cases). In abscesses of the cerebellum carious destruction of the mastoid cells or purulent sinus thrombosis is usually present (in 3 of 4 cases). In the fourth case suppuration near the foramen jugulare was found, probably extended along the aquæductus cochleæ or the acoustic nerve.

In meningitis the symptoms consist essentially in headache, general hyperæsthesia, high temperature, and accelerated pulse, which are followed by delirium, spasms of the extremities, trismus, and strabismus. If the medulla spinalis is implicated, lancinating pain in the lower extremities, frequently quite violent, opisthotonus and rigidity of the muscles of the nape of the neck are present. The pupils in meningitis cerebelli (also in cerebellar abscess) are at first contracted, later dilated. In three, among the eight cases no direct connection between the aural affection and

meningitis was found. In one case the tegmen tympani was missing, consequent on ulcerative processes; in two cases a great amount of pus was found in the sigmoid fossa (in one of which, with perforation into the mastoid cells). In two cases the infection was probably spread along the acoustic nerve. The meningitis was in all cases diffuse and especially marked at the base. In sinus thrombosis high fever, repeated chills, and the usual cerebral symptoms are present. The diagnosis is well established by additional œdema over the mastoid process, the temporal region, and the eyelids, by swelling and redness of the conjunctivæ, exophthalmus (thrombosis of the cavernous sinus), and particularly by swelling and increased sensitiveness along the internal jugular vein, which is felt as a hard and sensitive cord along the œdematous neck; although these pathognomonic symptoms proper were observed but twice among all twelve cases, the correct diagnosis was nevertheless made. In one case infiltration of the neck below the mastoid process, in another œdema of the eyelids, were observed. The pulse had a frequency of 80 to 100 and more; pyæmic fever, metastatic pulmonary abscesses were also present. In three cases articular metastases occurred. In sinus thrombosis epi- and sub-dural abscess are not unfrequently found, the subdural usually in the sigmoid fossa.

The author recommends the following method of operation: If in the course of otitis media cerebral symptoms occur, retention of pus in the tympanum or in the mastoid process should be borne in mind. He would open the mastoid, even if symptoms pointing to the latter are wanting. If the symptoms continue and the diagnosis is not established, he would trephine toward the transverse sinus (1" behind and $\frac{1}{4}$ " above the centre of the osseous external meatus. An epidural abscess may here be found. The sigmoid fossa can be explored with the probe. If no abscess is present, but the wall of the sinus covered with pus, he would attempt the puncture of the cerebellum. In order to gain room, it would be necessary to extend the resection somewhat posteriorly and downward. If the result is negative, he would puncture the sinus, and, if pus is found, he would incise. If the wall is normal he would first trephine on account of a possible temporal abscess ($1\frac{1}{4}$ " above and behind the external meatus). Unless an epidural abscess is here found, the lobe may be punctured. If here also nothing is detected, the cerebellum should be trephined as above and punctured. If, however, pus is present, the opening

established by trephining should be enlarged, and the covering skin removed. Temporary resection according to Wagner may also be made. Temporal abscesses were found on the right side in 6 cases, on the left in 3 ; sinus thrombosis on the right in 8, on the left in 3 cases ; cerebellar abscesses on the right in 1 case, on the left in 3 cases ; and meningitis on the right in 6, and on the left side in 3 cases.

UCHERMANN.

36. The complications from the cerebellum following otitis media are less frequent than those from the meninges and cerebrum. JOURDANET in his inaugural dissertation cites several observations in illustration of this subject. Cerebellar abscesses are much more frequent in adults than in children, and occur in some cases (5 per cent.) simultaneously with those of the cerebrum. In some cases they are separated from the original inflammatory seat by a layer of healthy tissue ; they are, though, as a rule, connected with it. They may be complicated with sinus thrombosis, basal meningitis, visceral lesions, etc. The diagnosis of these tumors, which is very difficult, is not made clearer by the author's observations. After unsuccessful trephining in the region of the temporo-sphenoidal lobe, trephining of the cerebellum is most frequently attempted. The author points out the carefully selected starting-point for the trephine. It is situated (like that of Poirier) in the centre of a line connecting the tip of the mastoid process with the tuberculum occipitale externum.

GELLÉ.

37. JANSEN reports a case in which from gradually increasing paralytic symptoms an abscess could be exactly localized in the temporal lobe. The operation verified the correctness of the diagnosis. The paralytic symptoms gradually decreased and the patient could be discharged as cured after two months. The patient, however, had a relapse at his home after a few days, with the same symptoms as before, lost consciousness, and died. Jansen then reports cases of cerebral abscess consequent to otitis media, which had been observed during the last two and one half years at the aural clinic of the Royal University at Berlin. "There were seven cerebral abscesses among about five thousand purulent and inflammatory processes of the middle ear." An abscess was diagnosed and localized in the right temporal lobe of the operated patient. A diagnosis of a probable abscess in the left temporal lobe without localization was made in the only case in which the

mastoid process had not been opened. Intracranial complications were assumed in two cases of cerebellar abscess, which succumbed rapidly before a second operation. "In the three remaining cases the result of the autopsy was a surprise to us."

RUMLER.

38. The case was that of a man, aged twenty-three, who had suffered from bilateral purulent middle otitis, due to variola contracted in the seventh month of age. The transference of the process from the tympanum to the inner ear was marked in the left ear by acute symptoms, as fever, headache, and vomiting, while in the right ear the affection set in with less pronounced symptoms. Exfoliation of sequestra followed in the right ear after seven, and in the left after three, months. Facial paralysis made its appearance on the right side after a two months' duration of the pain, on the left side after one month. The sequestrum exfoliated from the right ear contained the entire cochlea, that of the left formed a slightly curved tube, $\frac{1}{2}$ cm long, divided interiorly by a wall into two parts, which belonged to the lower cochlear turn. The examination of hearing revealed absolute anæsthesia of both nervi acustici for speech and noises, the tuning-forks C², C³, C⁴ being perceived neither by aërial nor by osseous conduction; C¹ and C being felt, but not heard. The pain was the first symptom of an affection of the inner ear. Disturbances of equilibrium were not marked until the other side was affected, when the symptoms of destruction assumed such proportions as not to permit the patient the slightest movement without danger of falling. The maintenance of equilibrium gradually returned when compensated for by the other senses. Subjective noises developed in the right ear after exfoliation of the cochlea, in the left before beginning of the pain, and were of an intermittent character. The patient finally died from meningitis. It is to be regretted that an autopsy was not held.

POLLAK.

e.—NERVOUS APPARATUS.

39. Prof. Dr. MINKOWSKI. Contribution to the pathological anatomy of rheumatic paralysis of the facial nerve. *Berliner klin. Wochenschr.*, 1891, No. 27.

40. FREUND and KAYSER, Breslau. A case of neurosis from fright with anomalies of hearing. *Deutsche med. Wochenschr.*, 1891, No. 31.

41. LARSEN, T. C., Copenhagen. Et Tilsælde of cerebro-spinal meningitis, Kompliceret und Oerelidelse. Død, Sektion. *Nord. med. Arkiv.*, vol. xxii., No. 14.

39. A case of an undoubtedly rheumatic paralysis of the facial nerve eight weeks after the beginning of the affection was accidentally examined post mortem and the nerves could thus be pathologically investigated. Apart from other symptoms, the patient had presented, a week after the beginning of the affection, decrease of sensation of taste in the anterior portions of the left half of the tongue, sensation of dryness in the left half of the oral cavity, slight increase of perception of hearing (hyperacusis) in the left ear. On *post-mortem* examination "an extremely developed degeneration of the nerve was found from the ganglion geniculi downward to the periphery, while the affected nerve was completely normal at the root and after its entrance into the Fallopian canal to the ganglion geniculi." "In the nervus petrosus superficialis major only some degenerated fibres were found, as well as in the nervus stapedius."

40. We would emphasize from the interesting lecture the points referring to the disturbance of hearing. Lightning strikes the ground very closely to a man, who experiences tinnitus and vertigo. Both membranæ tympani, the integument of the external meatus, the nasal mucous membrane became completely anæsthetic, complete deafness in the left ear, extreme deafness in the right ear. The bone-conduction is entirely destroyed. In closing the lids a subjective and objective noise develops in the left side, apparently a muscular sound due to the tensor tympani, which can be demonstrated from the movement of the membrana tympani with the aid of a monometer. The deafness is undoubtedly due to an affection either of the sound-perceiving apparatus or of the central organ.

NOLTENIUS.

41. The patient, a girl aged seven, became hard of hearing on the tenth day of a cerebro-spinal meningitis, completely deaf on the sixteenth, and died on the thirty-seventh. *Post mortem*: Membrana tympani normal. Extensive injection of the entire mucous membrane of the tympanic cavity, Eustachian tube, and antrum mastoideum; these cavities being filled with muco-pus. In the porus acusticus internus the nerves are embedded in pus. Canales semicirculares filled with reddish soft tissue (connective tissue with round cells in fatty degeneration and blood corpuscles),

the membranous labyrinth not recognizable ; in the vestibule and cochlea the same condition prevails, some pus being found in addition in the left vestibule. Considerable purulent meningitis of the convexity and base ; medulla spinalis also embedded in purulent exudation. The microscopical examination of the acoustic, and also of the facial, cochlear, and vestibular nerves does not reveal any pathological changes. The aural affection was apparently directly dependent on the meningitis. The author considers this case as the initial stage of the disease described by him and Dr. H. Mygind (*Arch. f. Ohrenheilk.*, 1890, p. 188), with ossification of the labyrinth.

BREMER.

f.—NOSE AND NASO-PHARYNX.

42. Prof. KESSEL, Jena. Some remarks upon the importance and methods of examination of the nasal and naso-pharyngeal cavity. *Correspondenzbl. d. Allgem. ärztl. Vereins von Thüringen*, 1891.
43. DEMME, Ozæna. *Deutsche med. Wochenschr.*, No. 46, 1891.
44. WAGNER, Halle. Cerebral affections after simple nasal operations. *Münch. med. Wochenschr.*, No. 51, 1891.
45. GRÜNWALD, Munich. Contribution to the surgery of the upper respiratory passages and their adnexa. *Ibid.*, No. 40.
46. KILLIAN, Freiburg. Notes upon the application of trichloracetic acid. *Ibid.*, No. 39.
47. CHOLEWA, Berlin. Resection of the nasal septum. *Monatsschr. f. Ohrenheilk.*, etc., No. 9, 1891.
48. LEWY, B., Berlin. The occurrence of Charcot-Leyden's crystals in nasal tumors. *Berliner klin. Wochenschr.*, No. 33, 1891.
49. NATIER. Mucous polypi of the nasal fossæ in children up to fifteen years of age. *Annales de la polyclinic de Paris*, July, 1891.
50. WAGNER, R. Rhinolith. *Münchener med. Wochenschr.*, No. 48, 1891.
51. NITSCHE, Salzbronnen. Case of bilateral rhinoliths. *Monatsschr. f. Ohrenheilk.*, No. 7, 1891.
52. BLOCH. Contribution to the treatment of empyema of Highmore's antrum. *Münch. med. Wochenschr.*, No. 34, 1891.

53. STEINTHAL. Contribution to the treatment of empyema of the frontal sinus. *Württemb. med. Correspondenzbl.*, No. 31, 1891.

54. Prof. VINC. COZZOLINO. Armamentarium and surgical technique of the treatment of nasal affections. (L'strumentario e la tecnica chirurgia pei seni nasali. *Bollet. delle Malattie dell'Orecchio*, etc., No. 6, 1891.

55. WAGNIER, Lille. Contribution to the study of the relations of adenoid tumors of the naso-pharynx to otitis media purulenta chronica. (Contribution à l'étude des rapports des tumeurs adénoides naso-pharyngiennes avec l'otite moyenne purulente chronique.) *Revue mens. de laryng.*, etc., No. 14, 1891.

56. RUAULT, ALB. The instruments for the removal of adenoid tumors of the naso-pharynx. (Sur le manuel opératoire de l'ablation des tumeurs adénoides du pharynx.) *Arch. internat. de laryngol.*, etc., No. 5, 1891.

57. DÉLIE D'YPRES. Adenoid vegetations of the naso-pharynx. Relapse with sarcoma. Sudden death. (Végétations adénoides du pharynx nasal. Recidives sarcomateuses. Mort subite.) *Revue mens. de laryngol.*, etc., No. 18, 1891.

58. HAGEDORN. Galvano-caustic treatment of pharyngeal diphtheria. *Deutsche med. Wochenschr.*, 1891, Nos. 28 and 29.

59. STRÜBING. Contribution to the treatment of diphtheria. *Ibid.*, 1891, No. 48.

42. KESSEL briefly describes the anatomy and physiology of the nasal and naso-pharyngeal cavities. We confine ourselves to emphasizing certain views of the author. The great relief experienced by the patients operated on for adenoid vegetations, with reference to improvement of thinking, in some cases of hearing and of sight, is explained by Kessel through alteration of the cerebral pressure. On account of the connection of the cerebro-spinal fluid with the system of nasal lymph vessels, the greatest amount of the former is brought freely to the atmosphere, forming the main source for the nasal moisture. Kessel believes himself justified in considering the system of nasal cavities as "respiratory organ" of the brain.

43. DEMME in almost all cases of ozæna has found a marked widening of the nasal dorsum and considers this abnormality as characteristic and necessary for the development of ozæna. The

microscopical examination of the mucous membrane shows the epithelial layer as thickened twenty-fold, while the glands are not essentially altered either in number or in appearance. With reference to the treatment the author obtained the best results with massage of the atrophied nasal mucous membrane, in connection with a 20 per cent. ointment of pyotktanin lanolin. The atrophied mucous membrane, which had become hypertrophied, had in some cases to be destroyed with the galvano-cautery.

NOLTENIUS.

44. WAGNER adds to three cases, collated from literature, a fourth observation of his own : The patient, *aet. twenty*, was cauterized with the galvano-cautery upon the lower and middle turbinated body (in furrows). On the following afternoon intense headache and rise of temperature (38° C.). On the following days two considerable hemorrhages, the latter being stopped by posterior plugging. The temperature was, an hour after plugging, 39° C. and rose on the following day to 39.8° C., associated with headache. On the third day, after 63 hours, removal of plug with simultaneous appearance of the first symptoms of meningitis. After pain had set in the right arm and humeral joint, death ensued on the 12th day *post operationem*. An autopsy was not made. There existed, according to the author, a thrombosis of the longitudinal sinus, developed from the middle turbinated body, the hemorrhage being a secondary feature (congestion). The rise of temperature after plugging is thus made clear. Hyperæsthesia of the arm and humeral joint were due to metastasis. The anatomy of the veins and lymph paths of the middle turbinated body, which was operated on in all four cases, favors the possibility of direct extension to the sinus and subarachnoidal space. MÜLLER.

45. GRÜNWALD reports the histories of two cases of operative opening of the frontal sinus. In the first case there was syphilitic caries ; although the anterior wall of the frontal sinus was chiselled off and a number of large and small sequestra, belonging to the nasal process of the upper maxilla, to the ethmoid, the nasal and the frontal bones, was removed, the deformity, nevertheless, after healing was but slight. In the second case there existed empyema of the frontal sinus and Highmore's antrum ; the latter was opened by Grünwald by chiselling, and when the suppuration from the frontal sinus retarded the healing process of the former, the latter, which had heretofore been treated with irrigations and insufflations of iodoform, was also opened. He then scraped the

cavity with the sharp spoon and plugged it. Recovery took place after not quite two and a half months without deformity.

MÜLLER.

46. KILLIAN uses a quite concentrated solution of the acid, applying it by means of a firm cotton pellet and the forceps, or with the aid of the probe mounted with cotton. In order to insure a permanent success, at least two applications are necessary. Killian uses for local anæsthesia 3-4 applications of a 20 per cent. solution of cocaine. The results, according to Killian, are not inferior to those of the galvano-cautery. MÜLLER.

47. For the operative treatment of removal of the cartilaginous septum, particularly if combined with scolioses or ridges of the osseous portion, CHOLEWA, like Hartmann, Krieg, and others, incises the mucous membrane of the diseased side with the galvano-cautery, and removes the deformed portion of the septum superiorly, posteriorly, and finally inferiorly with specially constructed chisels. The soft parts of the normal side are lifted by the elevator from the diseased side, after having severed the upper connections of the cartilaginous plate. A perforation can be avoided by constant attention paid to the normal side.

KILLIAN.

48. Formations resembling asthma crystals in appearance and chemical reaction are formed, in varying periods, in crushed pieces only, particularly of soft mucous polypi. RUMLER.

49. NATIER gives a careful report of congenital mucous polypi (communicated of late by Dr. Le Roy at the Soc. med. du VIIe arrondissement). He draws attention, from the scarcity of observations, to the rarity of the affection, since his case and that of Cardone form the only publications of this kind. GELLÉ.

50. Rhinolitis in a boy aged thirteen. The case is remarkable for the reason that as early as in the second year of age the first symptoms appeared, and the stone was completely wedged in the posterior portion of the right superior maxilla, there forming a cavity without occluding the nostril. WAGNER's explanation is, that the growing stone pushed the bone aside, preventing it from growing. The rhinolith was removed through the choanæ.

MÜLLER.

51. This remarkable case was that of a lady, aged forty, who had suffered since childhood from purulent nasal discharge and temporary frontal headache. An incrusted cherry-pit, of the

shape of a thorn-apple, 2 cm in diameter, was found to be wedged in on either side between the middle turbinated body and the septum. The patient had come under NITSCHE's treatment for bronchitis.

KILLIAN.

52. JURASZ has modified Krause's method in this way, employing a double-barrelled in place of the ordinary canula. Since the dry treatment did not yield special results, he had returned to irrigations. He irrigates in every case at first with water, then with solutions of creoline, and finally with water. This procedure has the advantage of insuring a good efflux. The author considers thorough cleansing as the essential part of the treatment. In addition Jurasz uses a double-edged trocar, the curvature of which extends over its entire length. For illustration of the success four cases are reported with recovery after 23, 28, 28 and 53 days, and a fifth case, in which the irrigation was made through the ostium maxillare, with recovery after 16 days.

MÜLLER.

53. STEINTHAL'S case illustrates the difficulty of recovery, even after operative opening. He had trephined and scooped out a case of bilateral empyema (fistulae at the orbital margin, no efflux of pus through the nose). The plugs were removed on the third, the stitches on the seventh, day. After a few days an orbital abscess was detected on the right, incised, and scooped out; but shortly afterwards, at first in the right and then in the left frontal sinus, additional pus gathered. After the second opening with resection of overlapping osseous edges of a great portion of the carious orbital roof, and after establishing a passage toward the nasal cavity, recovery took place without considerable deformity.

MÜLLER.

54. COZZOLINO gives a full and elaborate description of the affections of the nasal accessory cavities and their treatment.

55. WAGNIER points out that chronic purulent otitis media is of long duration and treated without success, when associated with adenoid tumors in the naso-pharynx. The suppuration, however, as is demonstrated by his cases, ceases immediately after the removal of these tumors. This is explained by the fact that the adenoid tumors form a mechanical impediment and produce hyperæmia and catarrh of the Eustachian tube.

BOK.

56. RUAULT recommends for general use a method for the removal of adenoid vegetations, successfully employed by him in

100 patients. The operative field, for several days before and after the operation, is antiseptically treated with insufflation of salol or aristol. The operation is performed at one sitting in narcosis with the head hanging down, with the aid of forceps devised by the author, which should be repeatedly introduced until all parts are thoroughly removed. It is necessary to explore the naso-pharynx with the finger before the introduction of the instruments. The advantages of this method consist in the fact that no relapses occur, and no complications, as fever, otitis media, tonsillitis, etc., take place on account of the previous antiseptic treatment.

BOK.

57. DÉLIE describes a case of adenoid vegetations in the naso-pharynx in an otherwise entirely normal patient, aged thirteen. The boy had been repeatedly operated; repeated relapses take place, the tumors partly filling the naso-pharyngeal cavity, associated with hemorrhages and swelling of the glands, until after a year and a quarter death suddenly ensues in the completely debilitated patient. The microscopical examination made after the first and second relapse revealed simple hypertrophied adenoid tissue. A malignant tumor was suspected after the first relapse. Toward the final conclusion the diagnosis of round-cell sarcoma was microscopically established. The author concludes from this case, that adenoid vegetations might relapse, that the relapses ought to direct our attention to the transformation into a malignant tumor, particularly after rapid development, that fully developed sarcomata do not always bleed violently, and frequently the result of the microscopical examination cannot always be substituted for other methods of examination.

BOK.

58. HAGEDORN treated thirty cases of pharyngeal diphtheria with the galvano-cautery, resulting in the death of but one patient, the average duration of recovery amounting to four and one half days, without injury to the patient and without sequelæ. Among the advantages of this method the author notes the possibility of localization, the avoidance of non-desired accidental effects, the lack of pain after applying cocaine, and the possibility of penetrating the parts. The author advises operating also those cases supposedly diphtheritic with the galvano-cautery. Gargles with antiseptic solutions are used for after-treatment. NOLTENIUS.

59. STRÜBING emphasizes the necessity of distinguishing in the initial stages, by culture experiments, the "real" diphtheria,

viz., that affection due to Loeffler's bacillus from pseudo-diphtheria, viz., that produced by streptococci, which resembles very much real diphtheria. In accordance with Loeffler he points out that the ideal treatment of diphtheria has to fulfil three indications: 1. To influence the vitality of the bacilli and to retard their growth, whereby simultaneously the further production of the deleterious matter is prevented; 2, to paralyze the effect of the poison upon the body which is already imbued with it; and 3, either to prevent the penetration of other micro-organisms into the soil of the mucous membrane affected with diphtheria or to destroy them respectively. Since this is possible with a certain exactness only in the initial stages, the early diagnosis is of great importance. The treatment comprises gargles or inhalations with lime water, carbolized alcohol, and sublimate, local applications with carbolized turpentine; alcohol and hydrargyrum cyanatum internally. For the exact doses see original paper. Strict attention paid to the urine protects against intoxication with carbolic acid.

NOLTENIUS.

NOTES FROM GREAT BRITAIN.

SOCIETY MEETINGS.

BRADFORD MEDICO-CHIRURGICAL SOCIETY.—At the meeting on March 15th Dr. A. Bronner showed a case of Thornwaldt's disease of the pharyngeal tonsil.

BRITISH MEDICAL ASSOCIATION—SOUTHEASTERN BRANCH—EAST SURREY DISTRICT.—At the meeting at Upper Norwood, on March 10th, Dr. G. R. Carter showed a patient who had been operated upon for subdural abscess, the result of ear disease.

CLINICAL SOCIETY OF LONDON.—At the meeting held on April 22d Mr. Arbuthnot Lane related an interesting and unusual case. A man, aged twenty-one, had his tonsil removed on December 16th, when there appears to have been considerable hemorrhage. Bleeding recurred on the 19th and again on the 20th. The patient was brought to Guy's Hospital, practically *in articulo*, on the 22d. Having introduced three and a half to four pints of salt solution into the circulation, Mr. Lane proceeded to expose the external and common carotids, and finding that there was a large pharyngeal artery present, and that other branches arose in the immediate vicinity, he decided to tie the common carotid. The patient left the hospital within a few days quite well. In the discussion which followed Mr. Harrison Cripps and others thought that, as a general rule, it was better to tie the external rather than the common carotid in these cases.

CLINICAL SOCIETY OF MANCHESTER.—At the meeting of this society on April 26th Dr. Milligan discussed the etiology and treatment of perforations of Schrapnell's membrane, illustrating his remarks with cases in which this lesion had been detected.

HARVEIAN SOCIETY OF LONDON.—The meeting of February 18th was devoted almost entirely to otological subjects. Mr.

Pepper read a paper upon "Disease of the Temporal Bone," which will be found *in extenso* in the *Lancet* of March 5th. In the discussion which followed Dr. Scanes Spicer expressed the opinion that the majority of cases of mastoid abscess were due to adenoid vegetations in the naso-pharynx. Dr. William Hill and Mr. J. Jackson Clarke referred to the normal and abnormal positions of the mastoid antrum, and sections were shown to illustrate the fact that in children the whole of the antrum was above a horizontal line drawn on a level with the upper border of the opening of the bony meatus, whereas in adults two thirds of the antrums were below this line. In all cases the space between the lateral sinus and the posterior border of the meatus was small. Dr. Macnaughton Jones showed a pocket rule and scale for handy use in these cases. In reply Mr. Pepper said that he thought that as long as there was room for the trephine immediately behind the ear accurate measurements were superfluous, and that very often the most tender spot was a good guide to the situation of the pus.

LEEDS AND WEST RIDING MEDICO-CHIRURGICAL SOCIETY.—At the meeting on February 19th Mr. Secker Walker showed some dissections of the internal and middle ears.

LIVERPOOL MEDICAL INSTITUTION.—At a recent meeting Mr. Richard Williams read a paper upon "The Treatment of Post-Nasal Growths." He uses a curved curette, which he has had made for him on the pattern of Volkmann's spoon.

MEDICAL SOCIETY OF LONDON.—At the meeting on February 29th Mr. Spencer Watson read a paper on "The Influence of Intra-nasal Obstruction on the General Health." Cases were related and drawings of specimens shown. Dr. F. de Havilland Hall and Dr. Scanes Spicer took part in the discussion which followed.

NOTTINGHAM MEDICO-CHIRURGICAL SOCIETY.—At a recent meeting Dr. Stewart read a paper on "The Nasal Cavities and their Diseases." At the same meeting Mr. A. R. Anderson, the President, related a case of nasal hydrorrhoea in a girl aged nineteen, which was found to be due to a polypoid condition of the mucous lining of the antrum, and when this was relieved a cure of the hydrorrhoea ensued.

At the meeting on April 6th Dr. W. B. Ransom and the President related a case in which a cerebral abscess, consecutive to

ear disease, had been treated very successfully by operation. The patient had had a discharge from his left ear for thirty years ; this suddenly diminished and symptoms of cerebral abscess ensued. At the operation less than the usual amount of difficulty appears to have been encountered in reaching the pus.

PATHOLOGICAL SOCIETY OF LONDON.—At the meeting on May 3d Dr. E. T. Wynne showed specimens of hæmatoma auris from the bodies of lunatics. He thought that the hemorrhage occurred not only subcutaneously but also into the degenerated cartilage.

LONDON POST-GRADUATE MEETINGS.—On Thursday, February 18th, Mr. W. R. Stewart lectured at the London Throat Hospital upon "Some Complications of Chronic Ear Suppuration."

APPOINTMENTS.

GRANT, DUNDAS, M.A., M.D., F.R.C.S., Eng., has been appointed Throat and Ear Surgeon to the West-End Hospital for Nervous Diseases.

MARSH, FRANK, M.R.C.S., L.R.C.P., Lond., D.P.H., Camb., has been appointed Assistant Surgeon to the Birmingham and Midland Ear and Throat Hospital.

BEQUESTS.

Under the will of the late **Mr. CHARLES H. WAGNER, of Birmingham,** the Deaf and Dumb Institution of that city has received a legacy of £100.

The late **Mr. OLIVER HEYWOOD, of Claremont, Pendleton, near Manchester,** has bequeathed the sum of £500 to the Manchester School for Deaf and Dumb.

INSTRUMENTS AND APPLIANCES.

A form of electric telephone has been devised by **Mr. Elphinstone, of 86 Canonbury Road, London, N.,** to enable deaf patients to hear the conversation of a person at a distance. The apparatus consists of the usual transmitter, battery, and receiver, with a length of connecting wire. Its peculiarities are : the battery is a dry one and is contained in a small case which can be placed upon the table ; a lever fixed to this case is so arranged as to connect the battery when the elbow is rested upon it, this being the usual

position when holding the receiver to the ear. A reel is also fixed to the side of the battery-case, upon which the connecting wire can be wound when not in use.

In some forms of middle-ear deafness this apparatus will be found to be more convenient than the trumpet or conversation tube, for being at a distance there is no chance that the speaker will blow into the ear of the patient, as so frequently happens under ordinary circumstances.

Mr. Herbert Butcher, surgeon to the Birkenhead Borough Hospital, suggests a new form of tonsillotome, the main features of which are that it is worked with scissor-handles and cutting blades, and retains the spear for transfixing the separated tonsil.

In the *Lancet* of March 5th Mr. Macnaughton Jones figures the rule and scale for use in trephining the skull in aural disease, as shown by him at the meeting of the Harveian Society on February 18th.

MISCELLANEOUS.

Mr. Aitken, of Edinburgh, gives, in the *British Medical Journal* of March 5th a series of three cases in which accumulations of cerumen appear to have caused more or less severe constitutional disturbance, in one instance with definite rise of temperature. Two of these cases were in young children, and the third in an old man of eighty-one, so that they afford another illustration of the well known fact, that at the extremes of life no abnormal condition is so trivial that we can afford to overlook it.

In the *British Medical Journal* for April 9th Mr. Alexander Black suggests, for perforating the mastoid, the use of a small gimlet to make the preliminary opening into the antrum, and this opening he subsequently enlarges by means of a cone-shaped burr as used by dentists. To maintain free drainage from the cavity, he uses the spiral wire drainage tube like that employed in antrum cases.

A case of cerebral abscess following upon otorrhoea of thirteen years' duration is reported from the York County Hospital [*Lancet*, March 5th]. The patient was trephined, but during the operation a serious condition of collapse ensued, and the operation was completed under artificial respiration. One or two ounces of foetid pus were withdrawn by means of a trocar, and the patient

rallied from the shock of the operation, but died the next day. At the autopsy, an abscess the size of a small hen's egg was found in the temporo-sphenoidal lobe.

Professor Politzer of Vienna has lately been on a visit to London, and the event was made the occasion of a very remarkable gathering of the aural surgeons of London, who, on Sir William Dalby's invitation, assembled to do the eminent otologist honor. Professor Politzer gave a highly interesting demonstration, and a short address of thanks.

Sir William Dalby's general statement to the effect that influenza has comparatively little effect upon healthy ears, and to which we referred in our last issue, is not to be allowed to pass unchallenged, for both Mr. Walker Downie, of Glasgow, and Mr. Stewart, of London, have written to protest that precisely the contrary has been their experience, and with this protest many other otologists will probably be inclined to agree.

We are, perhaps, too apt to imagine that outside the physiological laboratory, the lower animals do not lend themselves easily to the elucidation of these great problems in human physiology and pathology with which the scientific medical man of the present day is chiefly concerned. But that there is ample opportunity for really useful and interesting work in the field of clinical observation is sufficiently proved by some papers which have recently appeared in the veterinary journals.

For instance, in the *Kennel Gazette* for August, 1891, Mr. A. J. Sewell describes and figures an acarus, which he terms *Psoroptes auricularis canis*, and to which he ascribes the so-called "canker" in dogs. The interest of this observation lies in the fact that the parasite in question bears a remarkably close resemblance to the human acarus.

Again, on May 7th, 1891, Professor Fleming read before the Central Veterinary Society a paper in which he raised the question, "Does Ménière's disease occur in horses?" This paper was published in the *Veterinary Journal* for June, 1891, and is well worth reading. Professor Fleming points out that cases have been recorded in which symptoms analogous to those described as indicating the existence of Ménière's disease, or labyrinthine vertigo in man, have been observed in the dog and cat, and have been proved to have had their causation in the presence of some irritation in the external auditory meatus, such, for instance, as the

acarus above alluded to. Professor Fleming then gives particulars of the symptoms of two cases in which he was led to believe that the horses were suffering from something like labyrinthine vertigo, and certainly from the written descriptions there can be but little doubt that the diagnosis of "Ménière" was perfectly justifiable; the most marked peculiarity in each case being the tendency of the animal to fall to one side or to gyrate in one direction.

The publication of these observations naturally led to considerable correspondence, and to the expression of many opinions. In March, 1892, Mr. Goodall published the details of a case which had recently come under his observation, in which a pony suffered from symptoms almost precisely similar to those described by Professor Fleming in his cases. In this instance, however, a most careful and painstaking search was made to eliminate any possible extraneous irritation, and the result of Mr. Goodall's researches was that on scraping the ear and examining the scrapings microscopically, numerous dark fructifications of aspergillus were discovered, and, the case being treated with suitable fungicides, the animal made a complete recovery.

Even in the face of these observations, it would of course be rash to suggest that in the human subject labyrinthine vertigo may ever be ascribed to similar causes, but at the same time it cannot be out of place to draw attention to the possibility of such an etiology.

THE LENVAL PRIZE.—Baron Léon de Lerval, of Nice (France), offers a prize of 3,000 francs for the best application of the principles of the microphone to the construction of a portative apparatus that improves the hearing power of patients.

The competing instruments should be sent either to Prof. A. Politzer, or Prof. V. v. Lang, in Vienna, before December 31, 1892. The prize will be awarded at the 4th International Congress of Otology, September, 1893.

Members of the prize committee: A. Politzer and V. v. Lang, Vienna; Benni, Warsaw; Gellé, Paris; Pritchard, London; Roosa, New York; Grazzi, Florence.

Reviews.

Diseases of the Nose, Throat, and Ear. By P. McBRIDE, M.D., F.R.C.P. [Edin.]. Published by Messrs. Young & Pentland [Edinburg and London].

This is an excellent work, giving as it does a very complete *résumé* of the now extensive literature of the subject, compiled with great care and impartiality by a master-hand, and judiciously tempered with the author's own experience.

Dr. McBride commences with the diseases of the pharynx, then takes up those of the larynx, then those of the nose, and finally those of the ear. The two first divisions (pharynx and larynx) are not of so much interest to the otologist, especially as the nasopharynx is dealt with in the part of the work relating to the diseases of the nose, a very convenient though not perhaps a strictly anatomical arrangement.

The section on adenoid vegetations is very good, and gives the student a thorough idea of the very varied methods of treatment which are adopted by specialists. In dealing with the tests for hearing we think that the author may possibly mislead the student as to the ease with which the hearing power can be gauged by the voice ; and on the contrary, we are of the opinion that he somewhat underrates the value of the tuning-fork test. To a certain extent Dr. McBride appears to agree with Gruber's apprehensions as to the possible dangers from Politzer's method of inflation, but we cannot help thinking that these dangers are more imaginary than real. The chapter on the "Complications of Chronic Suppuration of the Middle Ear" is well worth reading, and the difficult subject of chronic non-suppurative inflammation is ably discussed, though we should like to have seen more stress laid upon Politzer's researches as to the fibrous changes which occur around

the stapes in this condition. Perhaps the weakest part of the work is the chapter on the "Auditory Nerve and Labyrinth," and this we trust will be improved in the next edition.

The book is written in an easy, one might say a conversational style, and this has the effect of giving the readers that insight into the mind of the writer which is so interesting and valuable to his fellow specialists.

The work is issued in an attractive form ; the colored plates are for the most part a distinct advance on the usual examples, although here and there they exhibit the failures so commonly met with in colored anatomical and pathological illustrations.

In the first paragraph of the Preface Dr. McBride says : "I have endeavored to meet the requirements of the senior student and general practitioner," and although we quite think that he has succeeded in this endeavor, yet we are also of the opinion that the work will be of greater interest to the laryngologist and aural surgeon.

Deafness and Discharge from the Ear. By Samuel Sexton, M.D., assisted by ALEXANDER DUANE, M.D. J. N. Vail & Co., New York, 1891.

A small octavo volume of eighty-nine pages, very well printed and captivatingly written in easy idiomatic English, for two classes of readers, first for "numerous inquirers, specially those whose letters the author has not the necessary time at his disposal to answer," secondly, for converting those who still doubt that the "excision of the drumhead and ossicles is a potent means for the benefit and cure of a vast number of persons who labor under the manifold afflictions consequent upon chronic catarrhal and suppurative middle-ear disease." The explanatory addition of the title-page, viz.: "The Modern Treatment for the Radical Cure of Deafness, Otorrhoea, Noises in the Head, Vertigo, and Distress in the Ear," will scarcely impress the professional readers favorably. Apart from this we can only say that the little volume gives a singularly clear exposition of the indications, the execution, and consequences of this delicate operation, and seems sufficient to guide even a beginner to perform the operation himself, only for the description of the instruments the author refers to his text-book. Though the profession looks upon the popular scientific medical literature with suspicion, the little treatise under consideration will be read by the general practitioner, and even the aural surgeon, with interest and benefit.

H. KNAPP.

Physiological Investigations Concerning the End Organ of the Eighth Nerve. By Prof. R. EWALD. With sixty-six woodcuts in the text, four lithographic plates, and one stereoscopic illustration. J. F. Bergmann, Wiesbaden, 1892. Reviewed by S. Moos, Heidelberg. (Translated by Dr. WARD A. HOLDEN.)

Two years ago Ewald described experiments which seemed to show that after the destruction of the semicircular canals on one side, a stronger innervation-impulse was required to produce voluntary muscular movement on this side than on the other, and that at the same time the absolute strength of the muscles on the operated side was markedly diminished. By these disturbances, and particularly by the difference in the function of the muscles in the two halves of the body, Ewald explains all the anomalies of motility which deaf persons with affections of the utricular apparatus show, and as these are symptoms of abolition, it follows that in the normal condition the labyrinth exerts a sensory irritation, the abolition of which brings with it a disturbance of function of the striped muscular system.

In the present book, which is a most careful and painstaking experimental physiological study, the author, as the result of his experiments, arrives at a number of conclusions which are of the greatest importance to the clinician as well as to the aurist, and the results of which greatly increase our knowledge of the much-disputed question as to the function of the vestibular apparatus.

The readoption of the name "nervus octavus" gives the reader a hint as to the contents of the work. "The eighth nerve," says the author in conclusion, "has so many and so important functions apart from that of hearing, that it no longer seems right to call it the auditory nerve, and this name is also inconvenient in describing it anatomically. A careful separation of its fibres into an auditory and another nerve has not yet been accomplished, and therefore the old designation, *nervus octavus*, has been used."

The fact that in the embryo the vestibular branch takes on a medullary sheath sooner than the cochlear branch, thus suggesting a difference in function, also favors the author's designation.

The main conclusions are as follows: "The labyrinth consists of two apparatus, differing in function: first, the auditory organ proper, situated in the cochlea, and, according to Ewald, corresponding to the dioptric portion of the eye; and, second, an

organ which exerts an influence on muscular action, the tonus labyrinth, an organ of sense."

We commend this excellent work most heartily.

Microscopic Atlas of the Normal and Pathological Anatomy of the Ear. By Dr. L. KATZ. Part. II. Aug. Hirschwald. Berlin, 1892. Reviewed by S. MOOS, Heidelberg.

The first part of this work has been already noticed in these ARCHIVES, particularly in regard to the value of the micro-photographic representation of preparations of the normal and pathological anatomy of the auditory organ.

Part II. contains twelve photographic reproductions; one normal, the ductus cochlearis of a Guinea-pig, highly magnified. The other eleven show pathological conditions of the membrana tympani, the ossicles, the cavity of the tympanum, the labyrinth wall and labyrinth structure from patients with tuberculosis, syphilis, primary and scarlatinal diphtheria, and from deaf-mutes. The photographs, while leaving much to be desired in the matter of finer cellular details, are excellent topographically.

Anatomical Observations on the Brain and Several Sense-Organs of the Blind Deaf-Mute Laura Dewey Bridgman. By HENRY H. DONALDSON, Ph.D. Reprinted from the *American Journal of Psychology*, vol. iii., No. 3, 1890, and vol. iv., 1891. Reviewed by H. STEINBRÜGGE, Giessen.

This paper contains observations on the brain and some of the sense-organs of Laura Bridgman, whose case, because of the relatively high degree of mental development obtained by the zeal and perseverance of her instructor, in spite of such apparently unsurmountable difficulties, has excited an interest throughout the whole civilized world.

The author has subjected the brain to a most thorough and careful examination from every possible standpoint. Before passing to a review of the more important results of this examination, it will be well to give a sketch of the early history of the patient, as this contains much that is indispensable in obtaining a correct idea of the pathological changes in the central organ.

L. B., of healthy parentage, had developed normally in the first two years of her life, was lively and intelligent, and could even speak a few words. At the age of two she had a severe attack of scarlet fever. Both eyes and ears were destroyed by suppuration, and taste and smell were injured by the inflammation of the nasso-

pharynx. Hearing and sight were lost, the patient preserving only perception of light in the right eye until her eighth year, when this also became completely blind. Loss of speech followed loss of hearing. The tuning-fork was not heard by bone-conduction, but the patient experienced nausea and giddiness when turned about. The portion of the labyrinth serving the balance-sense seems to have suffered less from the panotitis than the cochlea.

Convalescence was slow. Her strength was regained only at the age of five. When eight years old she was placed in the Perkins Institution and Massachusetts Asylum for the Blind, which was then under the direction of S. G. Howe.

Her training began with the use of raised letters, the name of an object being placed on the object itself, and handled by the child. In this manner the mental association of the object with its name was obtained, after which the girl spelled the name with the letters, and learned the meaning of the latter. How it was possible to teach her the significance of abstract terms is not told. It sounds very improbable when we read that Laura was the author of a journal, of three autobiographical sketches, and that she had kept a journal for ten years. These results of education are the more remarkable as the sense of feel was the only one normally developed. She had some perception of noise, but this, as it appeared, was through the medium of the sensory nerves, she recognized her friends by their voice and gait through the vibrations felt in her own feet. Her sense of temperature was poorly developed. The sense of smell and of taste improved somewhat in the course of time without becoming quite normal.

She died of a lobar pneumonia in her sixtieth year.

We shall pass by that portion of the report of the autopsy which does not interest us, and take up at once the report of the examination of the brain. The meninges showed no pathological changes. The brain, eye, petrous portion of the temporal bone, and a portion of the ethmoid were removed. The brain was hardened, first in Muller's fluid, then in a $2\frac{1}{2}$ per cent. solution of bichromate of potassium, and finally in alcohol.

First the volume of the brain was measured, then the weight of the whole and of the cerebellum alone, and also the specific weight of the brain substance. These measurements lay within the normal limits,

Various measurements of the brain showed that the distance between the apices of the frontal and temporal lobes was greater than the normal, and this was thought to be due to a retarded development of the temporal lobe.

When the fourth ventricle was examined, it was found that the *striæ acusticæ* had not suffered, but were well marked. The cerebellum showed no particular changes. In the mesencephalon the posterior corpora quadrigemina were small but well rounded, the anterior pair somewhat flattened. In the thalamencephalon the pulvinar of the left side was reduced in all its dimensions; that of the right side was spoiled for examination by being cut into while fresh. The corpus callosum was well developed.

The cerebral hemispheres showed broad gyri, the occipital pole was flattened, the left temporal lobe small, so that the left island of Reil was much less covered than the right. The lateral ventricles were not large. The frontal lobes were not so well developed, but the left was the smaller, as was also the left island of Reil. With the lesser development the sulci were shallower.

The cuneus of the right side was reduced in size. It is interesting to note that the left occipital lobe was better developed than the right. As the sight-centre is supposed to lie in the cortex of the occipital lobe, this would agree with the clinical fact that there had been some perception of light in the right eye up to the eighth year, and corresponding to this the right optic nerve and tract were larger than the left.

From the histological examination we learn that the cells of the cortex were markedly pigmented, and had irregular nuclei. The large ganglion cells were smaller than the normal, and were fewer in number in some parts. The sensory portion of the cerebral cortex had relatively fewer cells than the motor portion, and with the lesser number the cells were smaller, and the right hemisphere was more deficient in cells than the left.

The turbinate bones with the ethmoid were examined by A. C. Getshell. The bone was decalcified and cut in sections. There were found remains of a chronic nasal catarrh, consisting of a degeneration of the epithelium, an increase in the subepithelial connective tissue, and hyperplasia of the connective-tissue sheaths of the olfactory nerve, the fibres of which were otherwise normal. In the left superior meatus there was a fibrous adhesion between the septum and the upper turbinated bone, which changed

the path of the air current, and must have interfered with the smell on this side.

Both eyes were phthisical, showing no trace of retina. The extrinsic muscles were preserved, but were small. In the optic nerve there was an increase of connective tissue. The right optic nerve and tract were larger than the left.

The organs of hearing were examined by W. S. Bryant and H. F. Sears. The first reported on the condition of the external and middle ear, the latter on the labyrinth. The middle ear showed the remains of severe purulent inflammation, consisting of destruction of the membrana tympani, absence of the ossicles, bony obliteration of the Eustachian tubes at the tympanic end, hyperostoses of the walls of the tympanic cavity, and ossification of the fenestrae and sclerosis of the mastoid process. The tympanic muscles were atrophic. In the left canal a pseudo-membrane had formed.

The examination of the labyrinth, possibly because the preparations were not well preserved, was less satisfactory, and we read only that in both cochleæ numerous ganglion cells were found in the ganglion spirale.

The auditory nerves were cut at a distance of 3 mm from their exit from the medulla. Measurements showed that they were scarcely below normal size. The nerve fibres and the connective tissue surrounding them were normal. The same was found in respect to the fibres of the auditory nerve within the medulla and the nucleus of the nerve.

Donaldson supposed that changes had taken place in the cochlea, as the tuning-fork was not heard by bone-conduction, while the vestibule and semicircular canals, from reasons above stated, may have been less affected.

In giving our judgment of this work, of which so brief a sketch has been presented, we must remember that the text of the original represents only a small fraction of the time and labor which must have been spent in the numerous literary studies, as well as in the actual examinations. The author of this work has no small claim to the thanks of many scientific circles, and we heartily commend the study of the original to such as are interested in the subject.